

# THE AUSTRALASIAN MANUFACTURER

THE MARCH OF AUSTRALIA'S INDUSTRIAL PROGRESS



1950  
INDUSTRIAL  
ANNUAL

ADVERTISED AT G.P.O. OFFICE, FOR TRANSMISSION BY POST AS A NEWSPAPER.  
ANNUAL ISSUE OF "THE AUSTRALASIAN MANUFACTURER" THE MANUFACTURER'S  
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Thursday, June 15, 1950

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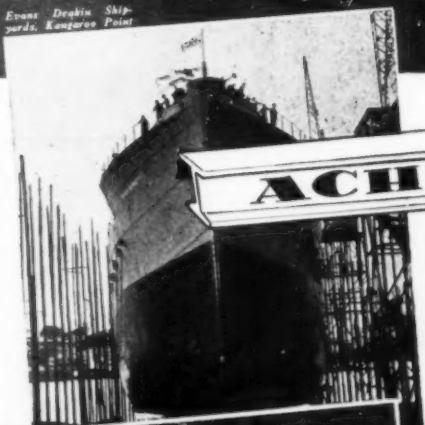
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and Possessions, £2; Foreign, £2/10/-. All subscriptions payable in advance.

ESTABLISHED 1916

JUNE 15, 1950

35th Year of Service to Industry

Edited and Published by  
Arthur A. Tighe for the  
Proprietors, The Manu-  
facturer Publishing Co.  
Pty., Ltd., 16 Bond Street,  
Sydney, and at Melbourne,  
Adelaide, Brisbane and  
Perth.



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1950, by The Manufac-  
turer Publishing Co. Pty.  
Ltd.). Printed for the  
publishers by Mastercraft  
Printing & Publishing Co.  
790-6 George St., Sydney

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Bartholomew, Franciscan Monk

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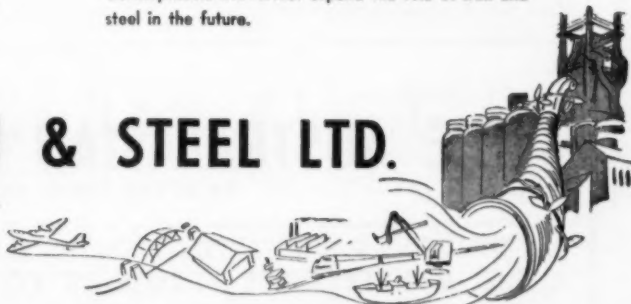
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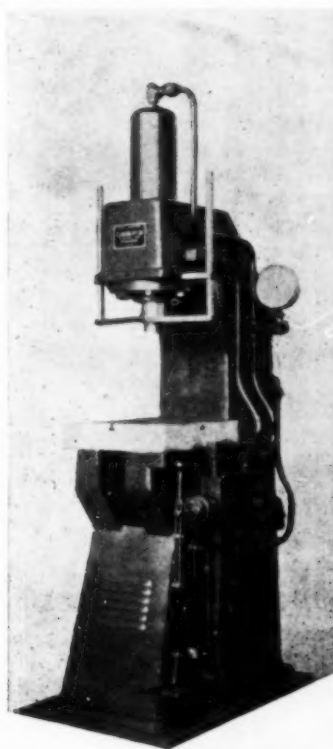
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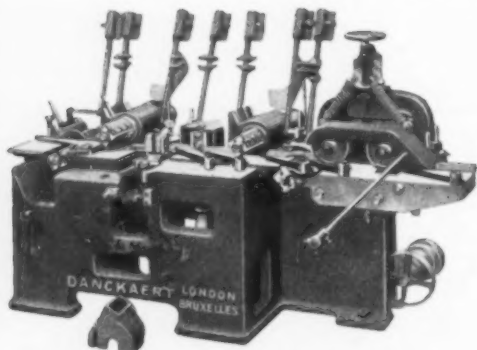




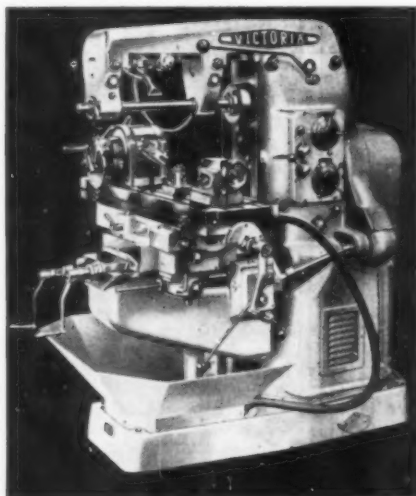
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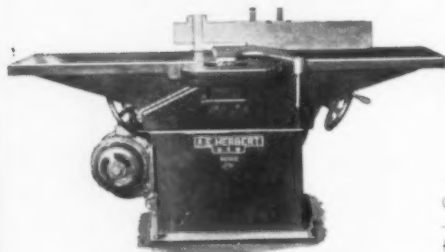
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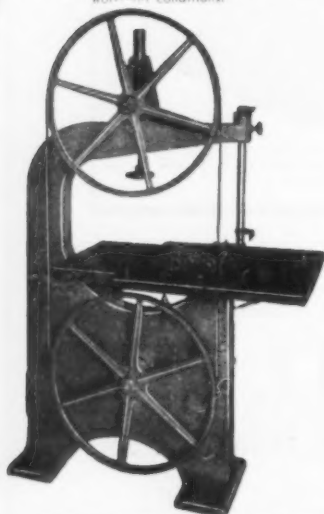
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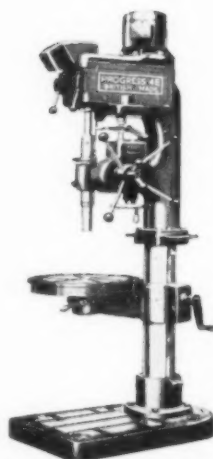
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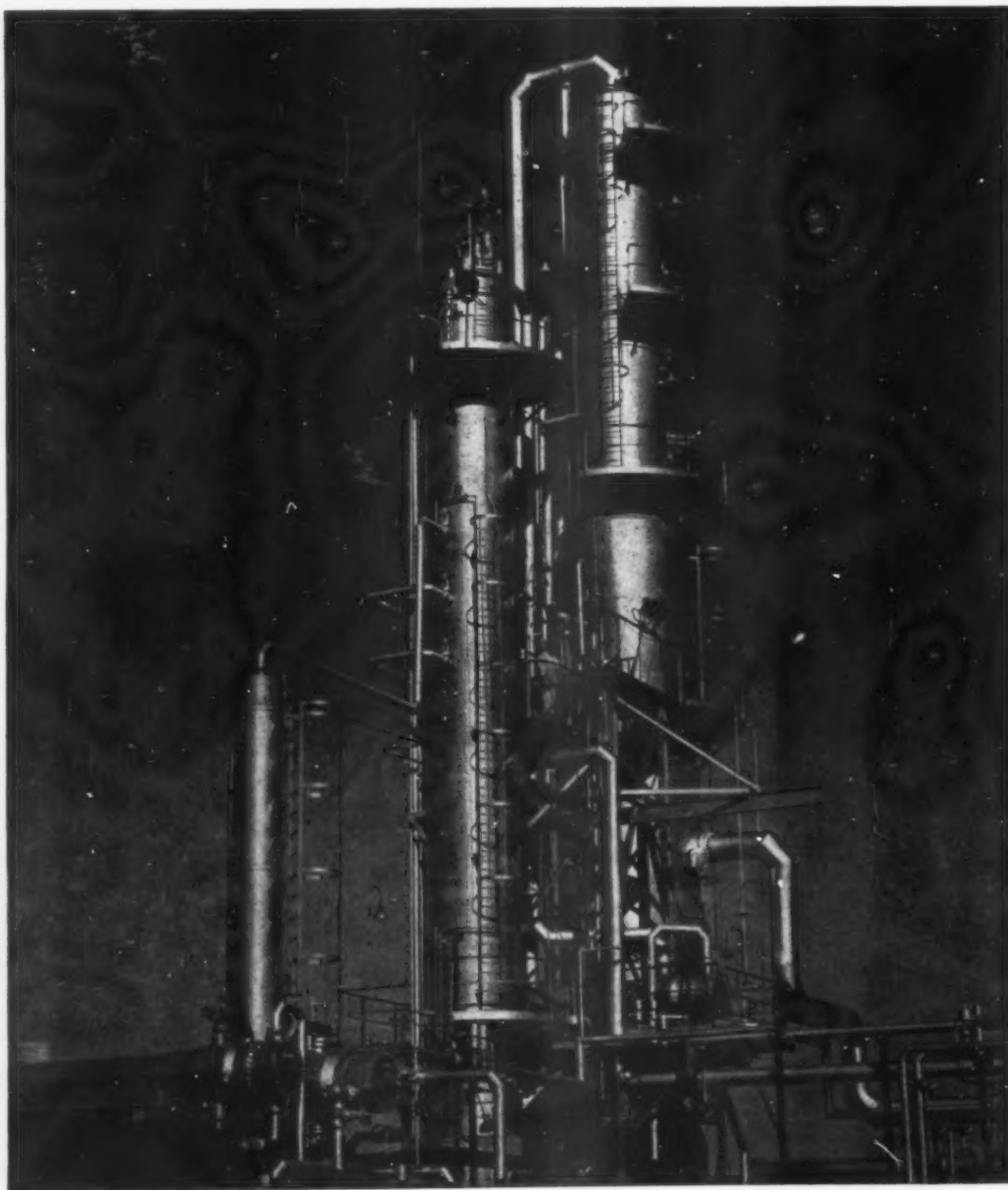
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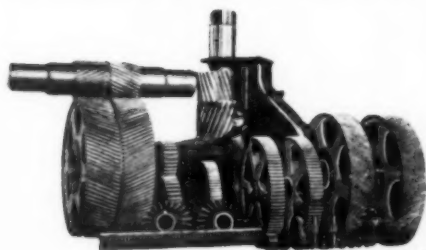


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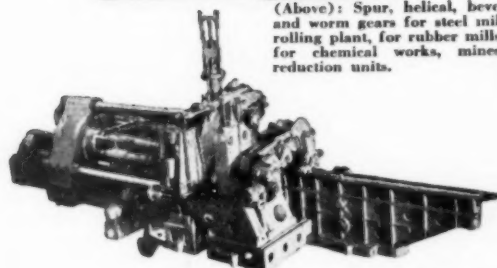
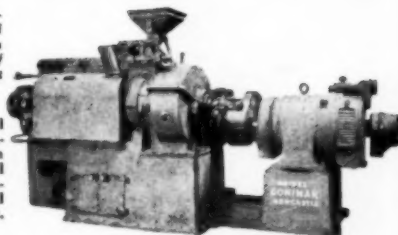


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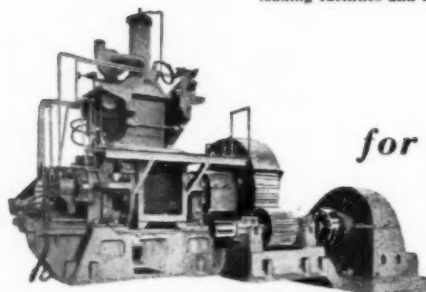
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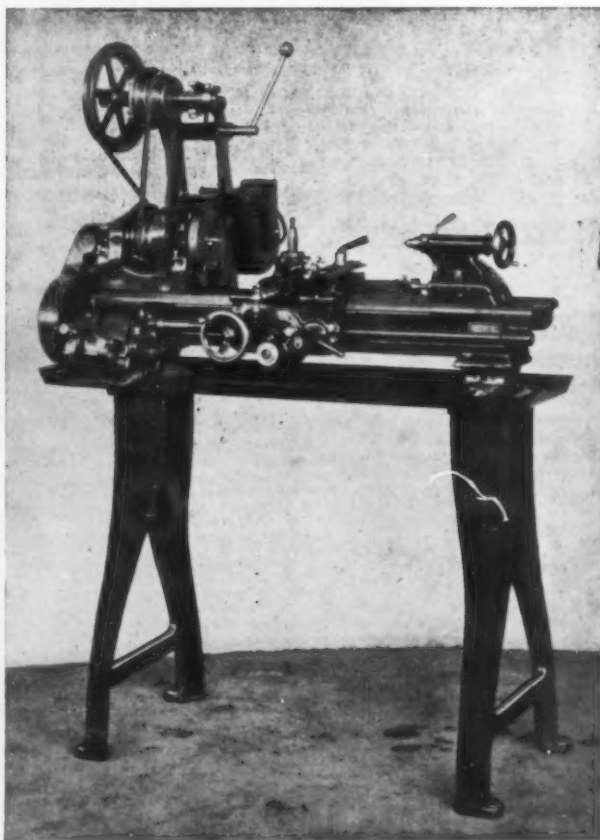
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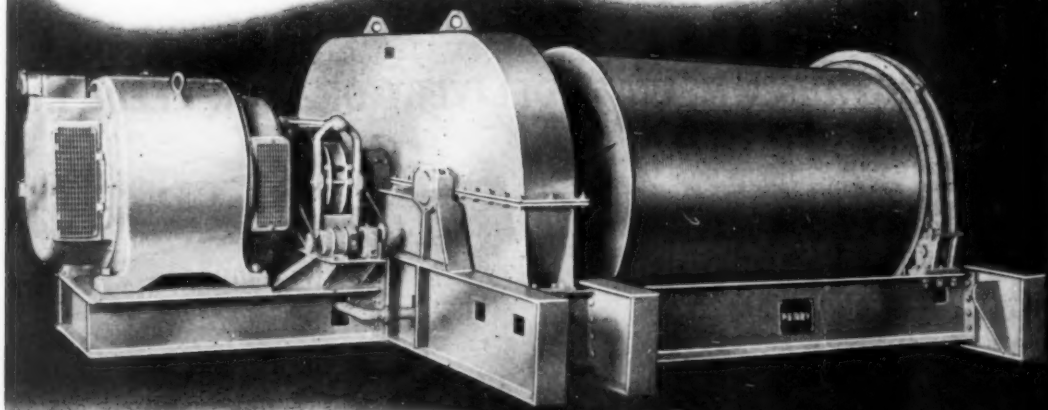
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MICA is probably the most important of electrical insulating materials, but is limited in size, and to overcome this disadvantage a close relative, MICANITE, is used by the electrical industry.

MICA AND MICANITE products are manufactured in our own factory and can be supplied at short notice.

MICA—Washers, Elements, Plates, Discs and Segments.

MICANITE—Moulding, Flexible, Commutator and Heat Resisting Grades.

MICANITE—Commutator Products, Mica-folium.

MICANITE—Commutator Segments, Rings, Channels, Angles, Tubes.

MICANITE—Tapes, Paper, Silk and Cloth.

MICANITE PRODUCTS—Products for practically all commercial applications.

We can materially assist you with your insulation problems.



## ELECTRICAL AND THERMAL INSULATION AND ENGINEERING SUPPLIES

Specialising in all forms of insulating materials required by the electrical engineer.

A wide range of stock in various qualities, sizes and grades is available throughout the Commonwealth.

Full particulars of Misco products available on request.

**MICA & INSULATING  
PTY.**



**SUPPLIES COMPANY  
LTD**

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MU 1530, Cent. 6506.

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BRISBANE: MISCO HOUSE, 134 ALBERT ST. Phone B 8803.

Interstate Agents for the products of the Ormiston Rubber Co. Pty. Ltd., Melbourne.

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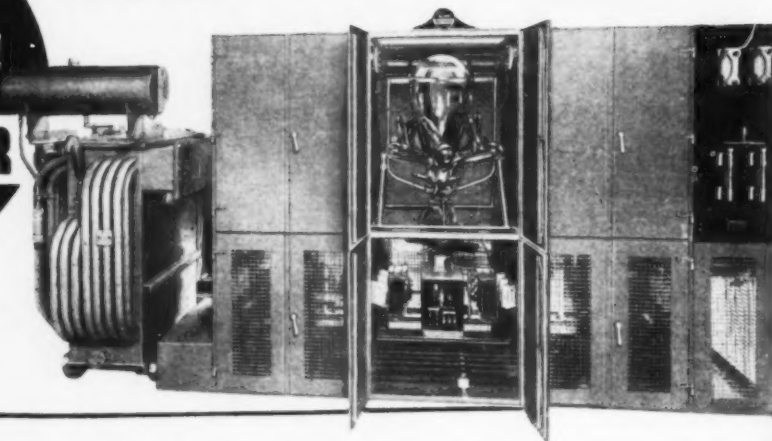
$\frac{1}{2}$  to 5,000 K.W.  
GLASS BULB

## Mercury-Arc Rectifiers



MANUFACTURED IN AUSTRALIA  
BY THE DON ELECTRICAL CO.  
PTY. LTD.

AGENTS IN ALL STATES

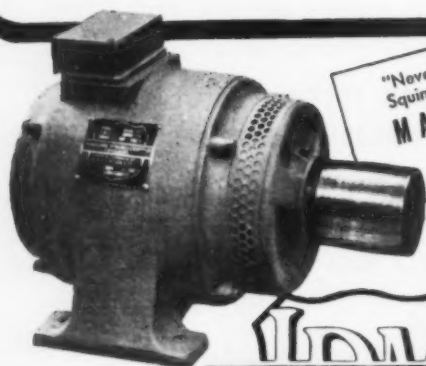


The earliest rectifier was the glass bulb unit. Within its very wide range of capacities and voltages, and within its range of applications, it has never been surpassed in either performance or economy of operation and maintenance.

NEVELIN RECTIFIERS, now manufactured in Australia to the original high standards specified by the NEVELIN ELECTRIC CO. of England, can be depended upon to supply direct current at high efficiency, and low installation, maintenance and operating costs for any of these

purposes:—

Traction, rail and trolley-bus  
Direct Current distribution  
Variable Speed Motor Drives  
Battery Charging  
Industrial Loading  
Lifts and Cranes  
Cinema Arcs  
Mining  
Welding  
and Special applications



"Nevelin" Arc Rectifiers and "Lancashire"  
Squirrel Cage Motors are now  
**MADE IN AUSTRALIA**  
to the strict standards of specifications  
of the parent English Companies.

### FREE LITERATURE

Write or phone your nearest Coates & Co. Office for free literature containing full technical and structural details of NEVELIN RECTIFIERS & LANCASHIRE MOTORS. Quotes for special installation will be gladly supplied.

## IMMEDIATE DELIVERY OF 1-5 h.p. SQUIRREL CAGE MOTORS

Engineers and electricians know that SQUIRREL CAGE motors are the simplest and least troublesome type available. That is why SQUIRREL CAGE motors are installed wherever possible.

The smaller Squirrel Cage Induction motors now being manufactured in Australia are constructed with the same degree of exactitude, quality and performance as laid down in the original LANCASHIRE specifications. LANCASHIRE MOTORS of all types and sizes are being used the world over in application to all classes of industry with outstanding success.

Immediate delivery of 1-5 h.p. motors is now possible, and immediate ordering of heavier motors will ensure prompt delivery.

Sole Representatives for Australian Made Equipment

MANUFACTURED IN AUSTRALIA  
BY O. J. NILSEN & CO. LTD.  
LTD.

AGENTS IN ALL STATES



ALSO REPRESENTATIVES FOR THE PRODUCTS OF  
THE "LANCASHIRE" GROUP

LANCASHIRE DYNAMO &  
CRYPTO LTD., ENGLAND

Alternators  
Generators  
AC & DC Motors

NEVELIN ELECTRIC CO. LTD.

Mercury Arc Rectifiers  
Variable Speed Drives

FOSTERS TRANSFORMERS &  
SWITCHGEAR LTD.

Transformers  
Switchgear  
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Laboratory Testing Plant  
Static Balancers AC & DC  
Oscillating & Resonating Units  
Testing Sets



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(MJ 4601)



# TWO... INDISPENSABLE FACTORS

• PLASTIC MOULDING  
COMBINED WITH  
• ENGINEERING EFFICIENCY

Here is an organisation that specialises completely in plastic engineering. Equipped throughout with the latest machinery . . . staffed by experts in plastic design and production . . . G.W. Engineering is able to apply the most efficient and economical processes of thermo-setting, thermo-plastics or combinations of metals and plastics in the ways best suited to your needs. Some typical products are illustrated but technical advice and estimates will be furnished on application.

## G.W. PRODUCTS ILLUSTRATED ARE . . .

19-point terminal block. G.W. is noted for electrical components.

The QIK-N-DEX . . . an improved type of phone index, adaptable for many other uses as well.

Telephone case . . . an excellent example of high-grade custom moulding.

Switchbracket assembly . . . a precision unit made under mass production conditions.

A drum-type switch which offers an amazing combination of circuits.

2-gang rotary switch. Can be had in sizes from single up to 6-gang.

# G.W.

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Melbourne Office: 403 Bourke Street. Phone MU 2858

Brisbane Office: T. & G. Building, Queen Street. Phone B 5308

Perth Office: 158 William Street. Phone B 7749

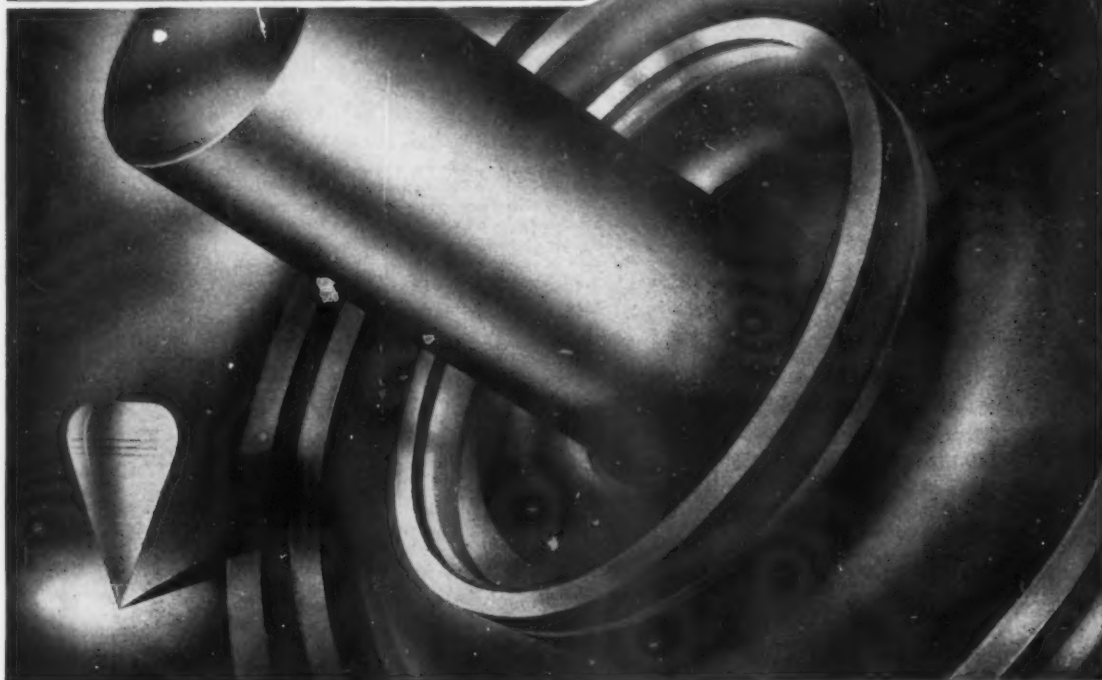
Telephone and Radio Apparatus... Switches... Precision Parts... Plastic Moulders... Thermo-plastic and Thermo-setting... Moulds, Tools Manufacturers of QIK-N-DEX for telephones, address systems, etc.

OVERSEAS ENQUIRIES SHOULD BE SENT DIRECT TO HEAD OFFICE



## Servicing Industry with

### **DYNAMIC BALANCING OF ROTATING PARTS . . .**



### **THEY MUST NOT SWING—THEY MUST NOT WOBBLE AS THEY SPIN**

The direct result of dynamic balancing of rotating parts is the elimination of damaging vibration, of reduced operating costs and longer, more dependable service from machines.

Whatever your equipment includes: High or low speed fans, rotors, centrifuges, pump impellers, armatures, turbines, turbine runners, shafts, flywheels, the slightest unbalance can cost you much in lower production volume, needless repair and maintenance, dangerous personnel hazards.

Our dynamic balancing equipment, operated under our own patent rights in the service of our clients, will detect the slightest swing or wobble in your machines, provide us with data essential for accurate correction of unbalance—ensure you of efficient and smooth-running rotating parts.

**Here's just one example:** A fan exhauster in a woodworking factory required replacement bearings every four months. Noise constituted a public nuisance. After dynamic balancing of the fan at our works, bearing troubles ceased, running became silent; replacement bearings fitted by us are still accurate after 24 months' running.

**CAPACITY AVAILABLE FOR EQUIPMENT OF ANY PHYSICAL DIMENSIONS  
AND UP TO 4½ TONS IN WEIGHT.**

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**GENERAL ELECTRICAL REPAIR & MAINTENANCE**

#### **MANUFACTURERS OF SPECIALISED ELECTRICAL EQUIPMENT AS FOLLOWS:**

- Lifting Magnets.
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- D.C. Welding Generators.
- Brake Solenoids.
- Traction Motors A.C. and D.C.
- Explosion-proof A.C. and D.C. Motors for Mines, Chemical Works, etc.

★ Equipment also supplied to client's specification or designed to meet special conditions and requirements.

*We do not manufacture Balancing Machines for sale. Our business is to utilise our patent rights to perform this Balancing Service for our clients.*



THE AUSTRALASIAN



MANUFACTURER



AUSTRALIAN MADE BEARING THE RELIABLE J.W.T. BRAND



Whilst we are not yet in the position to produce all the articles that we did pre-war, we are gradually catching up on production of household and factory necessities. Our production is growing every year, and whilst it grows we are adamant that the high standard J. W. TOMLIN products have always attained, shall be maintained, therefore, when you are seeking Galvanised Ware of any description, see that it bears the "J.W.T." brand. Quality material, plus high grade workmanship, goes into every article which leaves the Tomlin factory. Many other lines not illustrated are being manufactured—write giving us details of your requirements—we'll do our utmost to satisfy them. If it can be made from sheet metal—ask J. W. Tomlin.



**J.W.TOMLIN**

*Manufacturers of*  
Galvanised Ware, Tinware, Hollowware and all classes of Sheet Metal Work

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Telephones: RA 2117-8-9 (3 lines)





*Your Safeguard*  
**AGAINST OIL  
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Scientifically treated green chrome leather washer, moulded for precision sealing.

Coiled garter tension spring ensures even pressure on washer at all points.

Strong steel unit casing machined within precision tolerance.

Ceelx Oil Seals are mechanically perfect and are devised to increase the working efficiency of all machinery when lubricants must be effectively sealed and bearings protected from extraneous abrasive matter. The high quality material, coupled with the expert workmanship of Ceelx technicians, has resulted in the finest and most efficient oil seal available.

There's a CEELX Seal for your requirement.

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**OIL SEALS**

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THE AUSTRALASIAN

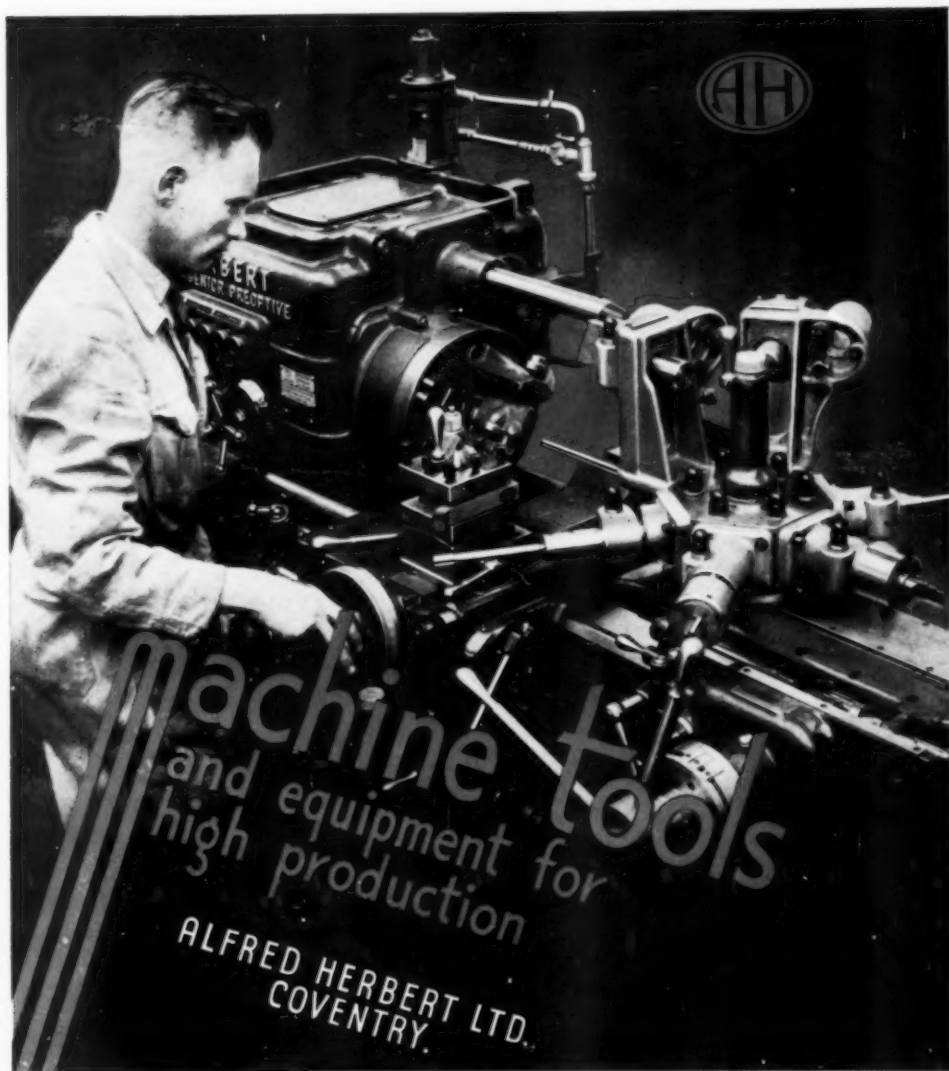


MANUFACTURER

# HERBERT

ALFRED HERBERT LIMITED, COVENTRY, ENGLAND

THE PRODUCT OF SIXTY YEARS' RESEARCH AND EXPERIENCE IN DESIGN AND MANUFACTURE, "HERBERT" MACHINE TOOLS HAVE ACHIEVED PRE-EMINENCE IN THEIR CLASS THE WORLD OVER FOR DEPENDABLE PERFORMANCE AND LASTING EFFICIENCY IN SERVICE



HERBERT  
No. 4 SENIOR  
CAPSTAN LATHE  
WITH PATENT  
POWER-  
OPERATED  
PREOPTIVE  
HEADSTOCK  
WHICH  
ELIMINATES  
IDLE TIME DUE  
TO SPEED  
CHANGING.

Sole Agents for Australasia:

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Queensland Representatives - - - QUEENSLAND MACHINERY Co. Ltd., 142-156 Albert Street, BRISBANE





# don't be afraid — of the heavy cut

## T.E.C. SMALL TOOLS ARE MADE TO TAKE IT!

Looking around machine shops all over Australia, we feel foremen and machine operators are perhaps exercising undue caution in the matter of depth of cut in many milling operations. Good milling cutters operate better when they are piling up the chips—they cut better and keep their cutting edge longer than when lightly loaded and merely tearing and scraping at the metal. So load up your T.E.C. milling cutters, plain mills, helical mills, end mills, face mills, form mills—we'll be happy to give you the benefits of our technical service and show you how to lift the ceiling of your present production capacity in milling operations.

### HERE'S AN ORDINARY EVERYDAY JOB—

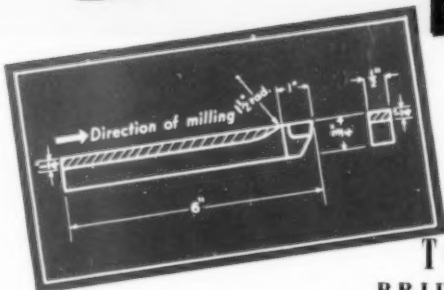
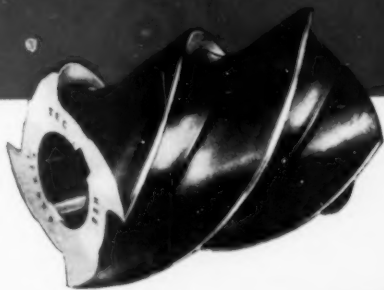
There is nothing extraordinary in this job, nothing special in set-up, nothing out-of-the-usual as regards T.E.C. helical mill performance.

*The Job:* Milling 6-sp tool shanks in 40-45 ton low carbon steel.

*The Cutter:* 3 in. dia. x 4 in. wide x 1½ in. bore T.E.C. helical mill.

*The Machine:* Cincinnati 2/13 production mill.  
*Speed and Feed:* Speed, 78 r.p.m. or 63 f.p.m.; feed, 2½ ins. per min.

**DEPTH OF CUT:** ¼ in. in one operation.  
*Coolant:* Vacuum.  
*Flare to Flare:* 2½ min. per batch of six.  
*Production Rate:* 100 pieces per hour.



SMALL TOOLS

TOOL EQUIPMENT CO. PTY. LTD.

BRIDGE ROAD, GLEBE, N.S.W.

MW 2789

MILLING CUTTERS • GROUND THREAD TAPS • CHASERS • SMALL TOOLS

Available from Leading Engineering Supply Houses throughout Australia and New Zealand

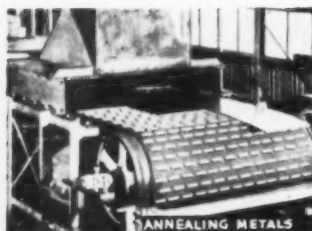


# "Melwire"

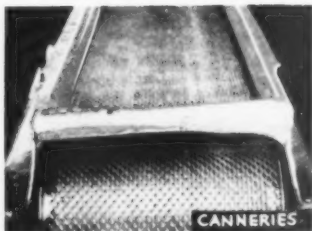
*Conveyor*

## BELTS

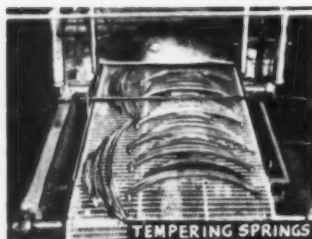
FOR ALL TYPES  
OF INDUSTRY.



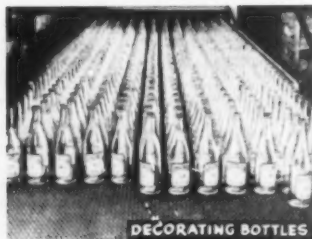
ANNEALING METALS



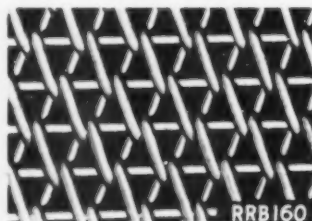
CANNERIES



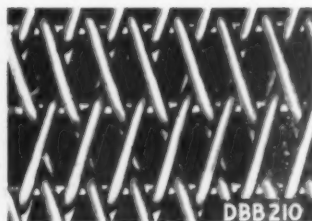
TEMPERING SPRINGS



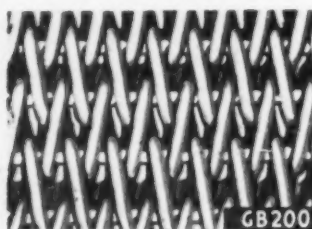
DECORATING BOTTLES



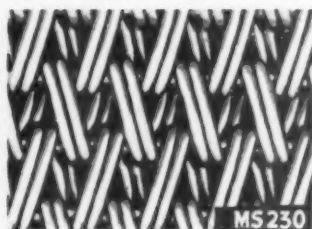
RRB160



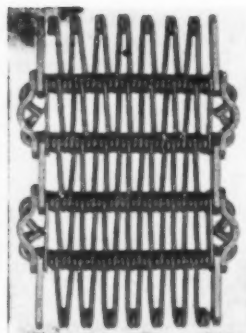
DBB210



GB200



MS230



"LOCKET"  
OR  
TWIST TYPE

is the strongest construction  
of any wire belt. Used par-  
ticularly for Coal, Briquettes  
and Cement.

"WOOL"  
DRYING  
FINE MESH BELT

We have designed a special  
type of fine mesh flat spirals,  
giving maximum strength and  
the greatest flexibility with  
minimum opening. (Pat. applied  
for.)

## MELBOURNE WIRE WORKS

85-99 CREMORNE STREET, RICHMOND, VICTORIA



# "MELWIRE" PRODUCTS

THE WIDE RANGE OF THE MELBOURNE WIRE WORKS

Telephone:  
JB 2341  
(5 lines)



Telegrams,  
Cables:  
"Melwireworks"

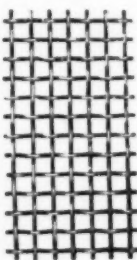
## WOVEN WIRE

**GAUZE** for  
Mining  
Milling  
Filtering  
Grading

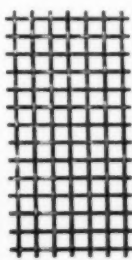
**SCREENS** for  
Harvesters  
Foundries  
Quarries  
Refineries



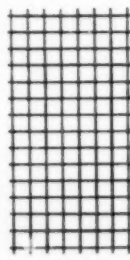
5 Mesh  
Open Space 29%



7 Mesh  
Open Space 57%



7 1/2 Mesh  
Open Space 66%



8 Mesh  
Open Space 75%

ALL MESHES ABOVE HAVE THE SAME APERTURES

## DRYING FLOORS

for  
Tobacco  
Chicory  
Copra

for  
Malt  
Glue

## WIRE

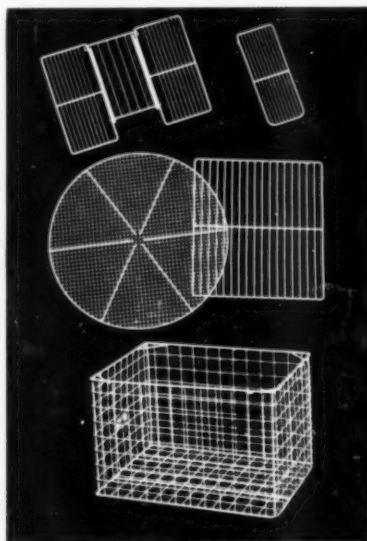
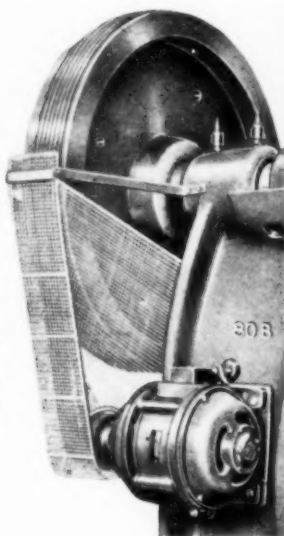
**TRAYS** for  
Refrigerators  
Dehydrators  
Ice Chests  
Biscuits  
Yeast

**GUARDS** for  
Lifts  
Trucks  
Counters  
Windows  
Machines

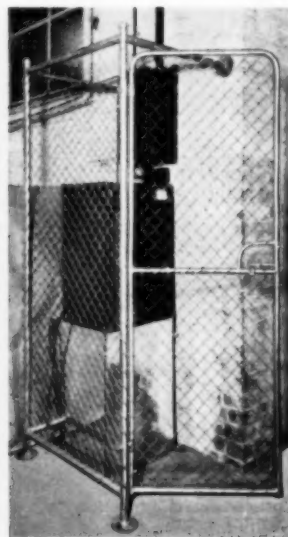
## FENCING AND GATES

for  
Factory  
Partitions  
Tennis  
Courts  
Enclosures

M  
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G  
U  
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D



BASKETS AND TRAYS



W  
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E

## WE MANUFACTURE MESHES AND GAUGES

In Brass, Bronze, Copper, Monel, Silver, Stainless Steel, High Carbon and Mild Steel, Galvanised, Tinned from 4in. mesh with 1/2 in. rods to 350 meshes to the lineal inch.

WIRE ARTICLES OF EVERY DESCRIPTION, such as Baskets for Annealing, Heat Treatment and Plating, Oven Racks, Griller Grids, Filters, Lamp Guards, Ventilators, Biscuit Trays, Hooks and Links.

**MELBOURNE WIRE WORKS**  
85-99 CREMORNE STREET, RICHMOND, VICTORIA



# MARTIN

## AUTOMATIC ELECTRIC HEATING EQUIPMENT

AIR-DRAW  
TEMPERING FURNACES



For rapid and uniform transfer of heat for all hardening and annealing work up to 750 C.

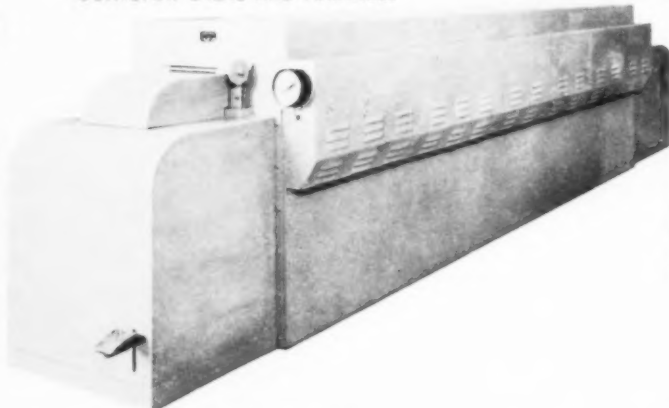
ENTRUST YOUR HEATING PROBLEMS

TO

AUSTRALIA'S LEADING ELECTRIC  
HEATING ENGINEERS

MARTIN PRODUCTS NOT ILLUSTRATED INCLUDE:  
Muffle furnaces, batch type drying ovens, air circulation ovens, plastic pre-heating ovens, bitumen heaters, foundry core ovens, stock pots, pottery kilns, centrifugal casting machines, blade brazing machines, etc.

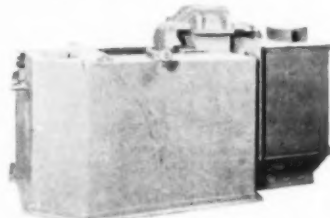
CONVEYOR OVENS AND FURNACES



Solve labour problems with Martin conveyor ovens and furnaces for all industrial baking, drying, glass fusing and annealing, with automatic control.

For better baking results use "Martin" electric conveyor and peel type ovens for cakes, pastries, pies, bread and all foodstuffs.

SALT-BATH FURNACES



Martin Units are compact, economical and outstanding for uniform, distortion and scale free hardening of high speed steel, dies and tempering work. Ranges from 600-1400 C.

AUTOMATIC ELECTRIC  
STEAM GENERATORS



Working pressures up to 100 lbs. in 20 minutes. Completely automatic controls make for great economies.

SOFT METAL  
MELTING POTS

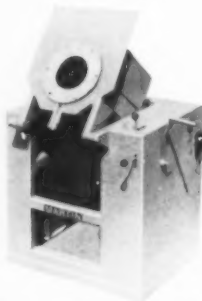
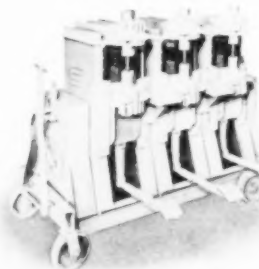


Illustration shows how a Standard automatic metal melting pot can be adapted to a wide range of uses up to 750°F.

ELECTRIC  
RIVET HEATERS



Hot rivets from 1" x 1/2" to 12" x 1 1/2" in from 30-120 seconds when required without burning or scale.

## MARTIN FURNACE & ENGINEERING PTY. LTD.

168 EUSTON ROAD

ALEXANDRIA, N.S.W.

PHONES: LA 4418

LA 5178

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*It's a*  
**WORLD BEATER!**



*The*  
**KBC**  
*electric*  
**MIXER**

K.B.C. again pioneers a new market with the K.B.C. Electric Mixer. It sets a new standard of value in mixers, a new standard of performance in this class of electrical kitchen equipment. Priced at £14/19/6, this model brings a once luxury article within the range of every purse. Skilfully engineered—including exclusive patent beaters—scientifically tested, with hygienic, non-porous finish, the K.B.C. Mixer is in every sense a "World Beater."

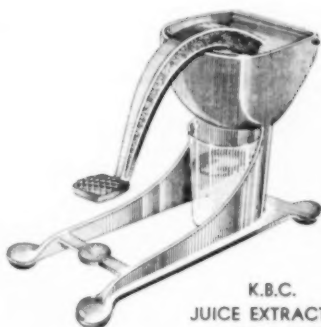
**OTHER K.B.C. ENGINEERED PRODUCTS INCLUDE**

**K.B.C. BEANCUTTER**—Well favoured in the hardware market for its keen performance and keen price.

**K.B.C. ELECTRIC DRILL**—24V. and 32V. A.C. or D.C., 1/2" capacity, is rapidly taking its place in every man's tool kit. It retails at £5/16/6 for 24V. and £7/13/- for 32V.

**K.B.C. JUICE EXTRACTOR & FOOD PRESS**—Another Kitchen favourite because it saves so much time and work in food and drink preparation. It costs only £1/11/6.

**K.B.C. WRINGER**—The first K.B.C. engineered product still holds pride of place—first—in the moderately priced wringer market. £4/19/9.



**K.B.C.  
JUICE EXTRACTOR  
& FOOD PRESS**



**K.B.C.  
ELECTRIC DRILL**



**K.B.C.  
BEANCUTTER**

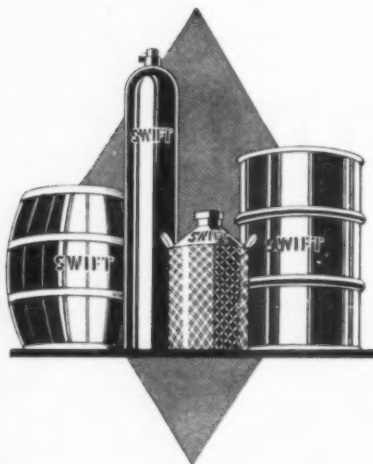


**K.B.C. WRINGER**



**K.B.C. DIECASTING**—K.B.C. produce diecasting for the motor body, refrigeration and electrical industries, solving a host of production problems and saving production costs. Save money and headaches—consult K.B.C. engineers for custom diecastings.

**K. BOWES & CO. LTD., DIECASTERS, WOODLANDS PARK, ADELAIDE, SOUTH AUSTRALIA**



## Science streamlines industry

In 1925, a world-recognised chemical publication listed market prices for about one thousand industrial chemicals. The number to-day exceeds 5,500, while from 1939 to 1947 there was, according to the U.S. Bureau of Census, an increase of nearly three hundred per cent. in the sales of one group of organic chemicals.

What stupendous progress has developed since Sir William Crookes stated, in 1898, that nitrogen must be obtained from the air in a standard form for fertilizer if a state of world-wide starvation was to be prevented.

More and more rapidly new chemical products, technical and engineering materials are being made available in commercial quantities for every phase of industry as a result of the co-ordinated research of men and women in every branch of science.

We take pride in our close association with chemical industries throughout the world, which enables us, by keeping in touch with every new and forward movement, to provide information, service and chemical products conforming to the highest speci-

fications. These are all essential to the progressive manufacturer, ensuring avoidance of waste in terms of manpower, materials and plant.

### For

Industrial and Fine Chemicals  
Drugs, Solvents, Plasticizers  
Moulding Powders and Machinery  
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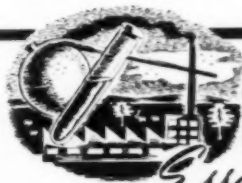
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## SCIENTIFIC ACTIVITY *Essential to Food Supply*

Last year, we referred to the danger of the world's food supply becoming inadequate. On the same theme, we now quote from an article which appeared recently in the American Cyanamid Company publication "For Instance" and in doing so thankfully acknowledge its source.

"The discovery that human and animal food must contain certain vital elements in addition to a minimum of calories and proteins was of utmost importance in the conquest of dietary diseases. The symptoms of beri-beri were described in China about 2600 B.C. but it was not until 1882 that Takaki cured it in the Japanese navy by feeding more vegetables, fish and meat to the sailors. He was totally ignorant of the curative principle in these foods, and even in 1911, when Funk originated the term 'vitamine' for such things, there was no knowledge of their exact chemical nature. To-day, we not only have an expanding alphabet of vitamins but we know the chemical constitution of many of them and are able to produce them synthetically.

From 1920-1925 the so-called vitamin B was extracted with water or alcohol from rice polishings, wheat germ, yeast and the leaves of several plants. It was the vital factor necessary for curing beri-beri and pellagra. However, when heated to about 118°C. it was no longer effective against beri-beri, but was still active for pellagra. Evidently it was a complex and not a simple material. Further study revealed that its thiamine content is the factor for beri-beri and its nicotinic acid for pellagra. But its complexity did not stop there, for now we know that the B complex contains riboflavin, pyridoxine, pantothenic acid, choline, inositol, biotin and folic acid. And the end is not yet in sight, for the most recent discoveries are the B<sub>12</sub> factor and the 'animal protein factor.'

These discoveries are the culmination of effort in several fields of research. One aimed to find the factor in chicken feed which produced the most rapid growth in chicks, and the most hatchable eggs from hens. Another was looking for the factor in animal feed which produced the best reproduction and lactation in rats. And another wanted to know the exact factor in liver which restored pernicious anemia victims to health.

Vitamins are but one essential of our life to-day, but whatever your need, be it concerned with your process, plant or supplies, the "Swift" Industry-Wise Service is always at your disposal with the assurance that your confidence is in trustworthy hands.

Since 1927 it was known that satisfactory chicken feed should contain some animal protein, but in 1947 it was found that this could be replaced with the product from a fermentation process. This product apparently contained the animal protein factor. The bacillus for the ferment was obtained from chicken or cow manure and such organisms as *Streptomyces aureofaciens*. After concentrating and refining the product from the fermentation process it was announced, in July, 1948, that it was also therapeutically active for pernicious anemia.

In the Spring of 1948 research in England and U.S.A. isolated a red, crystalline compound from liver which was active for pernicious anemia and it was called vitamin B<sub>12</sub> in this country. When added to an unsatisfactory diet for rats, it improved lactation and reproduction. It improved certain deficient diets for chicks but it was not so complete in this respect as the animal protein factor obtained from the fermentation process. Therefore it appears that the animal protein factor consists of B<sub>12</sub> plus some factor as yet unidentified.

Subsequent research indicates that the important animal protein factor may be produced from many materials by the correct fermentation process. This will ensure an adequate and uniform supply. Feed manufacturers then will produce special foods so that the farmer may convert chicks and porkers into maximum quantities of eggs and meat in the shortest possible time. This will help to prevent mankind's pantry from ever looking like Mother Hubbard's cupboard, and it will provide another factor to combat dietary disease.

*Despite recurrent forecasts that the rapidly increasing population of the world is destined for starvation because of insufficient food supplies, there seems no need for fear if science is kept active. For indeed, it is the province of scientists not simply to maintain life, but to maintain it more abundantly."*



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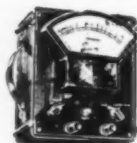
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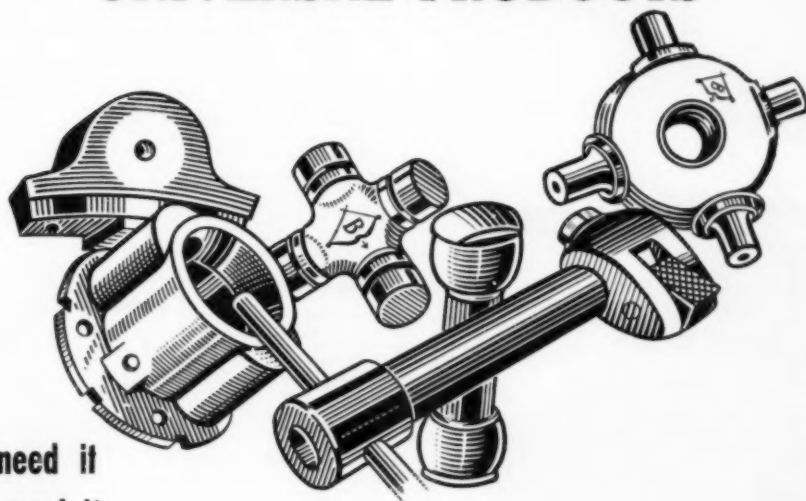




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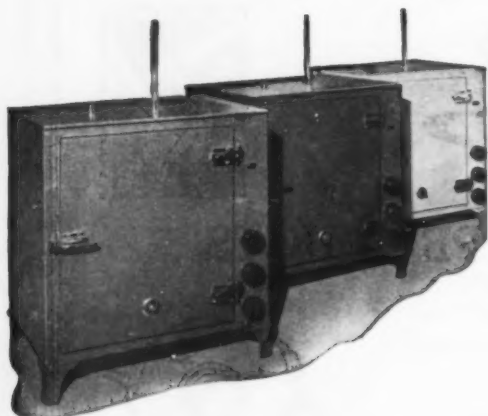
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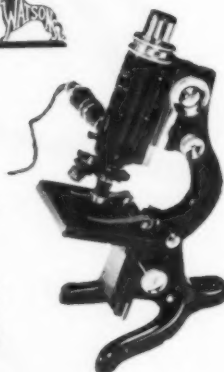
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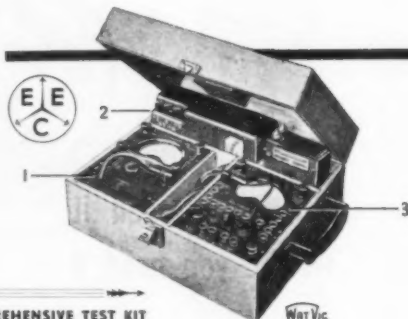
Based originally upon the design of the "Service" microscope, which is so highly esteemed for laboratory purposes, this stand has been developed expressly for metallurgy and offers advantages not usually found in combination for this purpose.



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### MUIRHEAD PORTABLE pH METER

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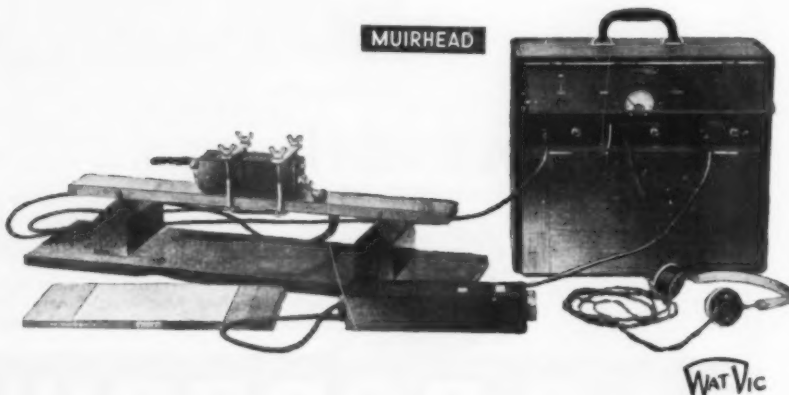
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This MUIRHEAD instrument is designed for the measurement of strain or deformation produced in a material when a deforming force or stress is applied. It is eminently suitable for use on steel or masonry structures, even in exposed positions. The term "acoustic" is used because the gauge depends for its operation upon the variation of frequency of a wire vibrating at approximately 900 c/s. Strains as small as  $10 \times 10^{-6}$  can be measured.

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The Super-Responsive EVERETT EDGUMBE Grapher records rapidly fluctuating quantities such as voltage, current, speed, power-factor, frequency, etc., by an ink line direct on a paper roll. Owing to the extremely high response, the Super-Responsive Grapher can replace, for many industrial and research purposes, the costly and intricate electro-magnetic oscillograph.

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### SPECTROGRAPH:

A metal, when vaporized and suitably excited in a flame, arc or high tension spark, can be made to give out light of definite characteristic wave lengths. The Spectrograph arranges the various radiations as lines on a photographic plate in strict order of wave length, thus leading to identification of the substance emitting the radiations.

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### METALLURGICAL MICROSCOPES:

The use of the microscope for examination of grain structure of metals and alloys is an outstanding example of the many valuable applications of the instrument to industrial purposes. The microscope gives important information concerning the chemical and physical properties at every stage of manufacture of metals and alloys, and indicates whether each process has been properly carried out before the next is taken. The instrument is an essential one in laboratories and workshops of all large works engaged in the production and manufacture of metals. The WATSON microscopes for metallurgy possess all the special features necessary for this type of microscopy.

### pH METERS:

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Paper Making	Food Preserving	Brewing
Textiles	Gas By-products	Ceramics
Water Purification	Jam Making	Cosmetics

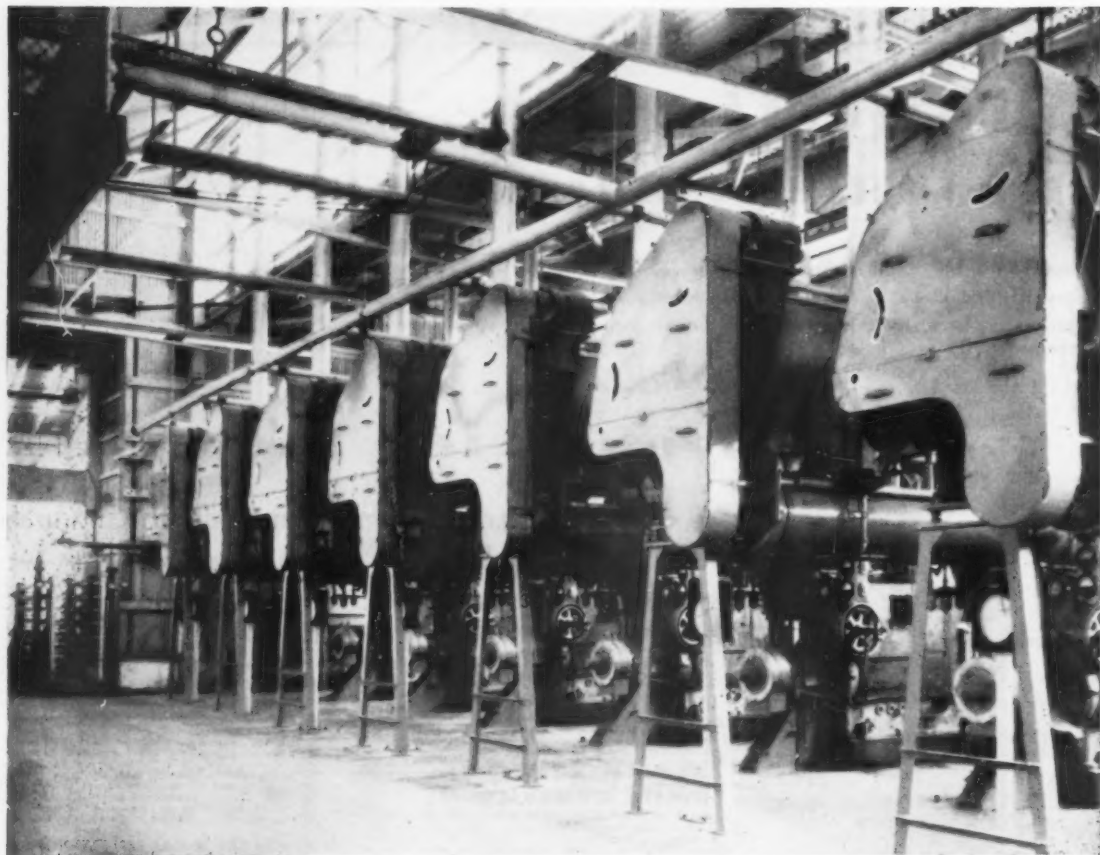
MUIRHEAD pH meters use a new electrometer circuit which is easily standardised and gives accurate readings. The meters can also be used as high impedance millivoltmeters for electrometric titrations.

### STANDARD CELLS:

The MUIRHEAD Weston Standard Cell is used as a reference standard for potentiometric electrical measurements and for industrial applications requiring a built-in reference E.M.F. It is a cadmium cell of saturated acid type, with cadmium amalgam and mercury electrodes. The E.M.F. is 1.01859 absolute volts at 20°C. with a temperature coefficient of approximately  $-0.00004$  per °C. between 15 and 25°C. Muirhead & Co. Ltd. have recently announced a new miniature standard cell with the above characteristics, but only  $2 \frac{1}{2}$  in. square by  $3 \frac{1}{2}$  in. high and of very robust construction. It can be built into an instrument with the knowledge that, with correct use, it will last for many years.

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The difficulty of reading the ordinary mercury thermometer accurately and quickly is a common experience. This difficulty is entirely obviated by the "Red-Reading Mercury" feature of the Palmer Thermometers made by INDUSTRIAL THERMOMETER CO. The red column is obtained by reflection. Mercury is a natural mirror so that a strip of red glass to the side of the bore will be reflected as a red image from the mercury and as the mercury rises in the tube, only a bright red column is seen. This can be read more quickly, thus saving time; it can be read more accurately, thus eliminating mistakes.



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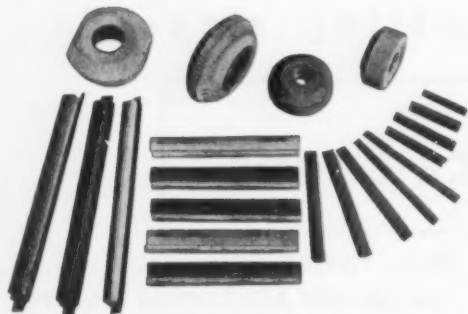
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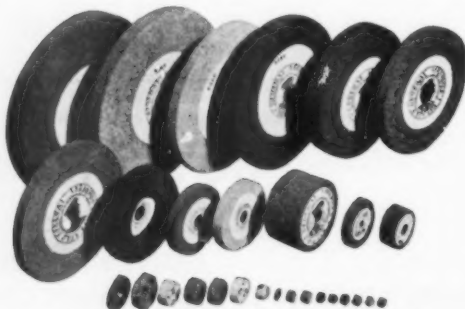
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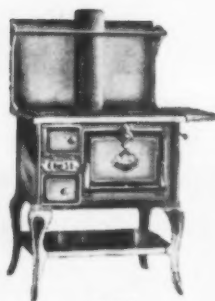
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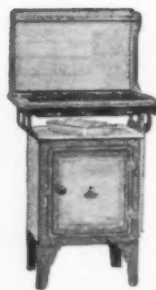
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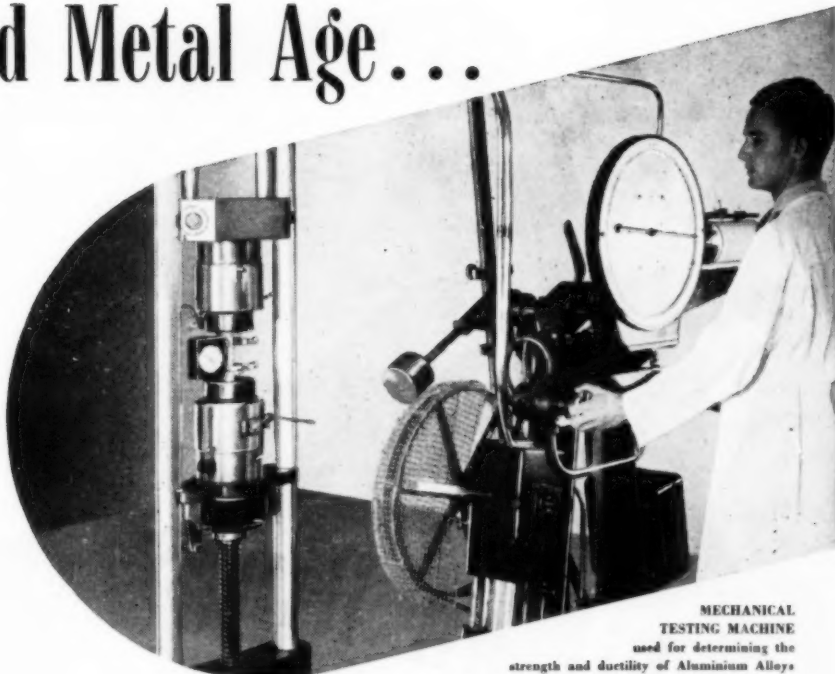
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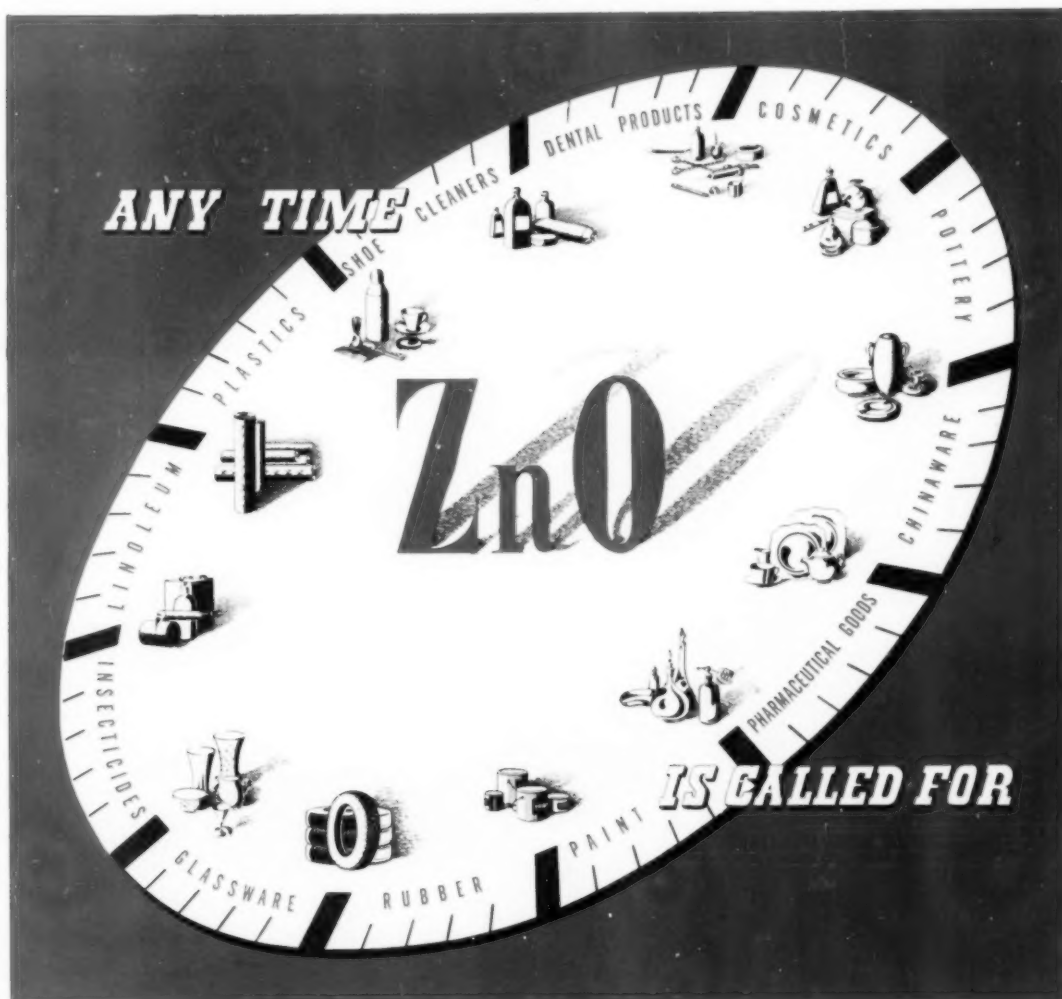
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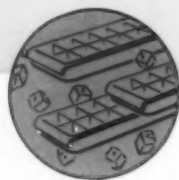
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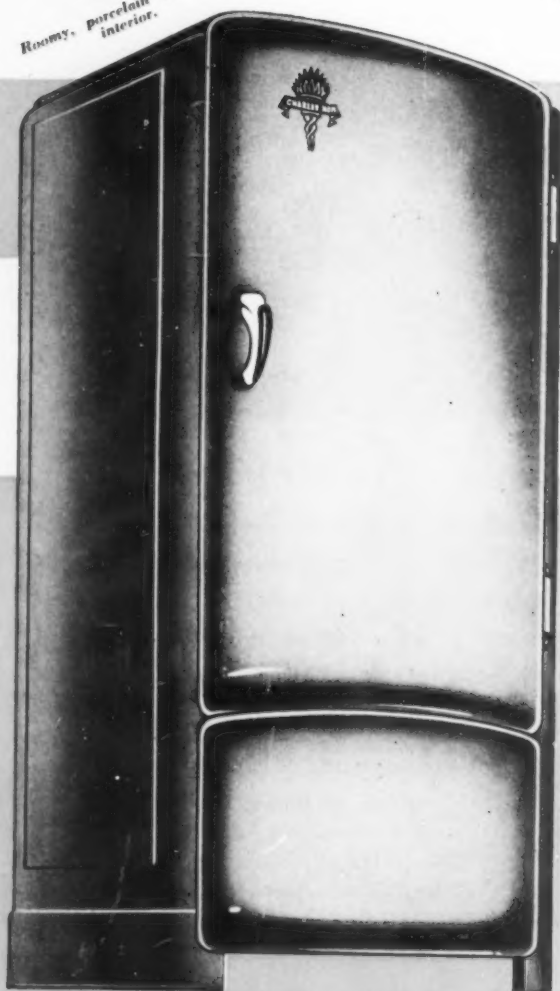
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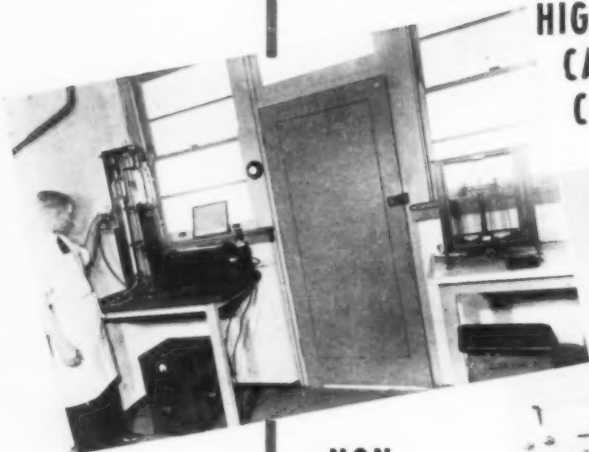
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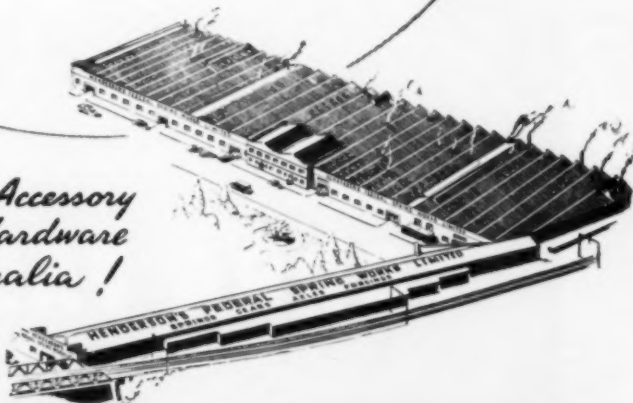
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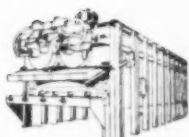
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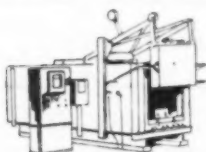


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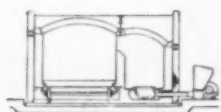
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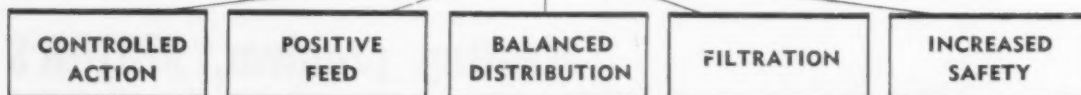
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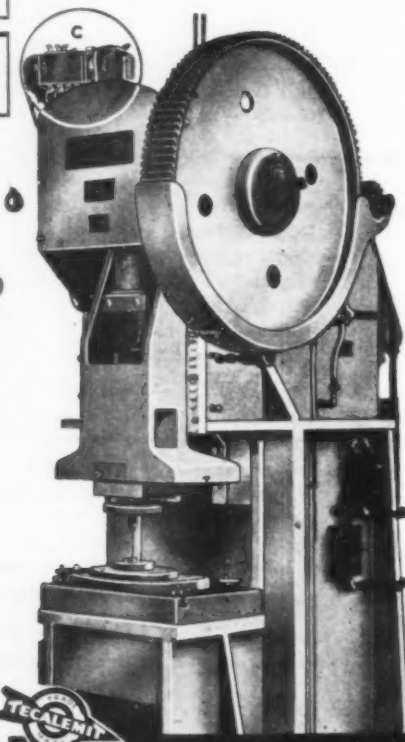
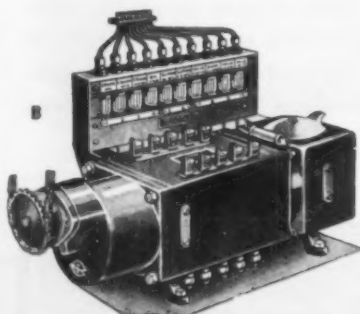
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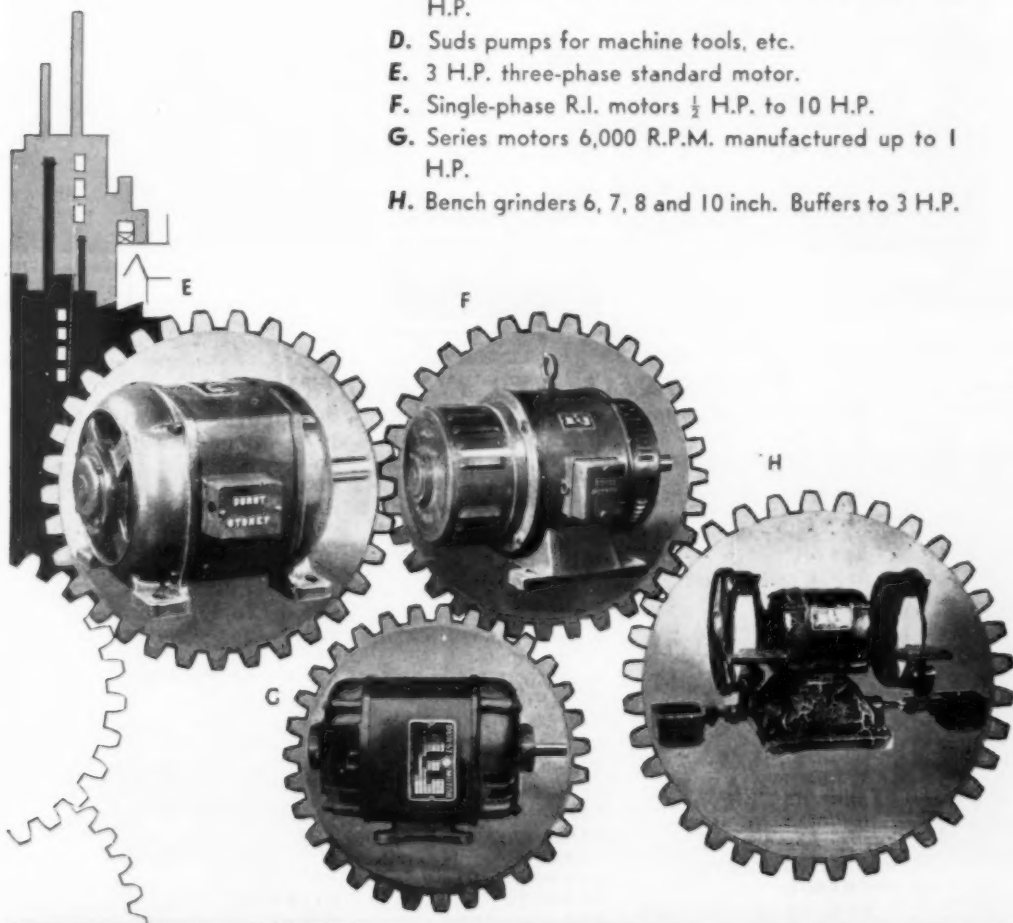
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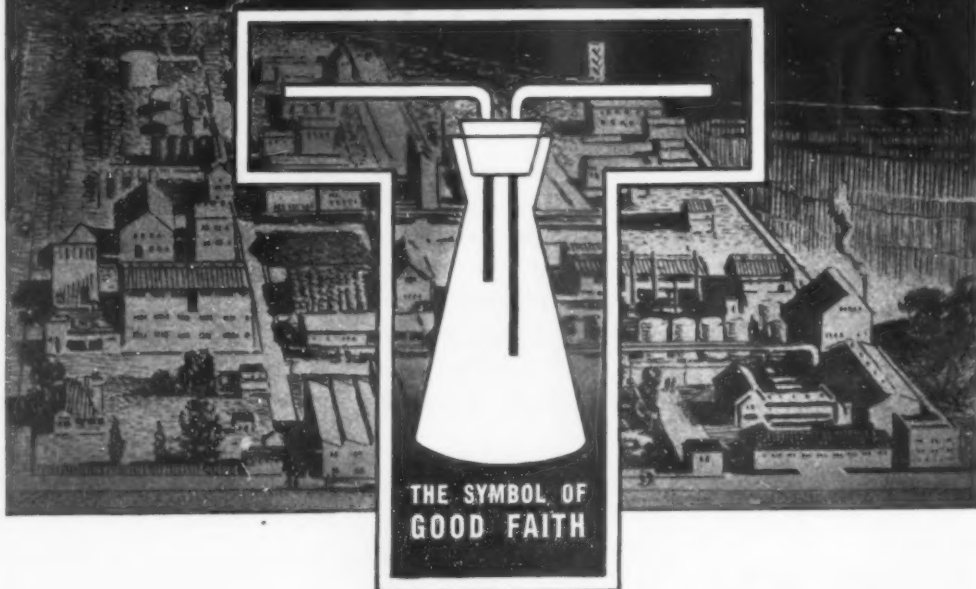
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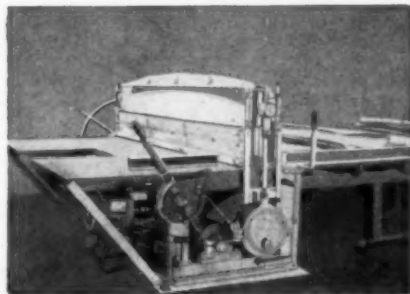


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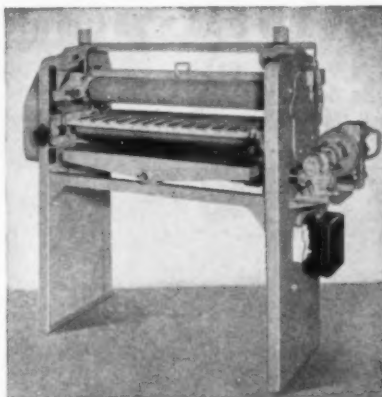


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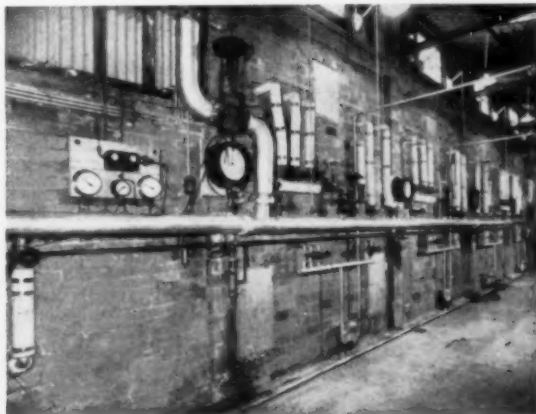
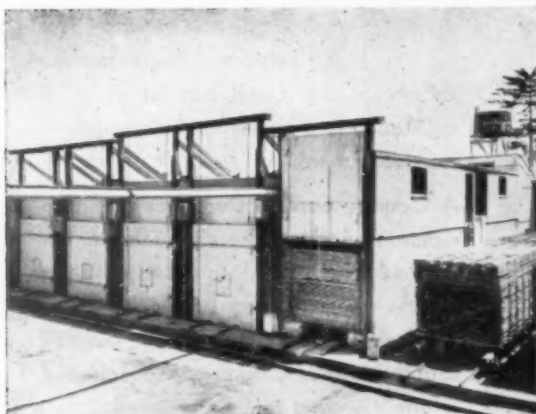
**THE NATIONAL 1½ BAG, CASEIN GLUE MIXER** is driven at 38 r.p.m. by a 3 h.p. motor through a train of bevel gears. The mixer is easily accessible for cleaning.



**NATIONAL GLUE SPREADER.** The outfeed side of a 5in. diameter roll model for cabinet manufacture.



**NATIONAL GLUE MIXER.** Twin-opposed beaters make it speedy and thorough. Double-hinged lids simplify cleaning.



A battery of four 42-ft. timber processing and drying kilns for which the complete pipework, fittings and controls were manufactured and installed by National Engineers for the Union Timber Co. Pty. Ltd., Leichhardt. Constructed to the design of the C.S.I.R., Division of Forest Products, these kilns are fully automatic. The whole operation of processing or drying is controlled from a simplified panel, conveniently placed at the rear of the kilns as illustrated above. Designs and quotations for similar installations of any specified size will be submitted on request.

Phones:  
LM 4481-3

# NATIONAL ENGINEERS PTY. LTD.

White & Brennan Sts.  
Leichhardt, N.S.W.  
Australia



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**AT YOUR  
SERVICE**

**in more  
ways than one**

The resources of the Lysaght organisation are at the service of every user of the Company's products — from the casual purchaser of Lysaght's Galvanized Iron to the biggest manufacturer.

A special Technical Advisory Panel, for example, provides complete information concerning the various grades and qualities of steel sheets available for manufacturing purposes. Recommendations from this Panel can be of great assistance to a manufacturer's engineering department.

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*You are cordially invited to take full advantage of these Lysaght Service facilities.*

L199-8110

**John Lysaght (Australia) Pty. Ltd.**

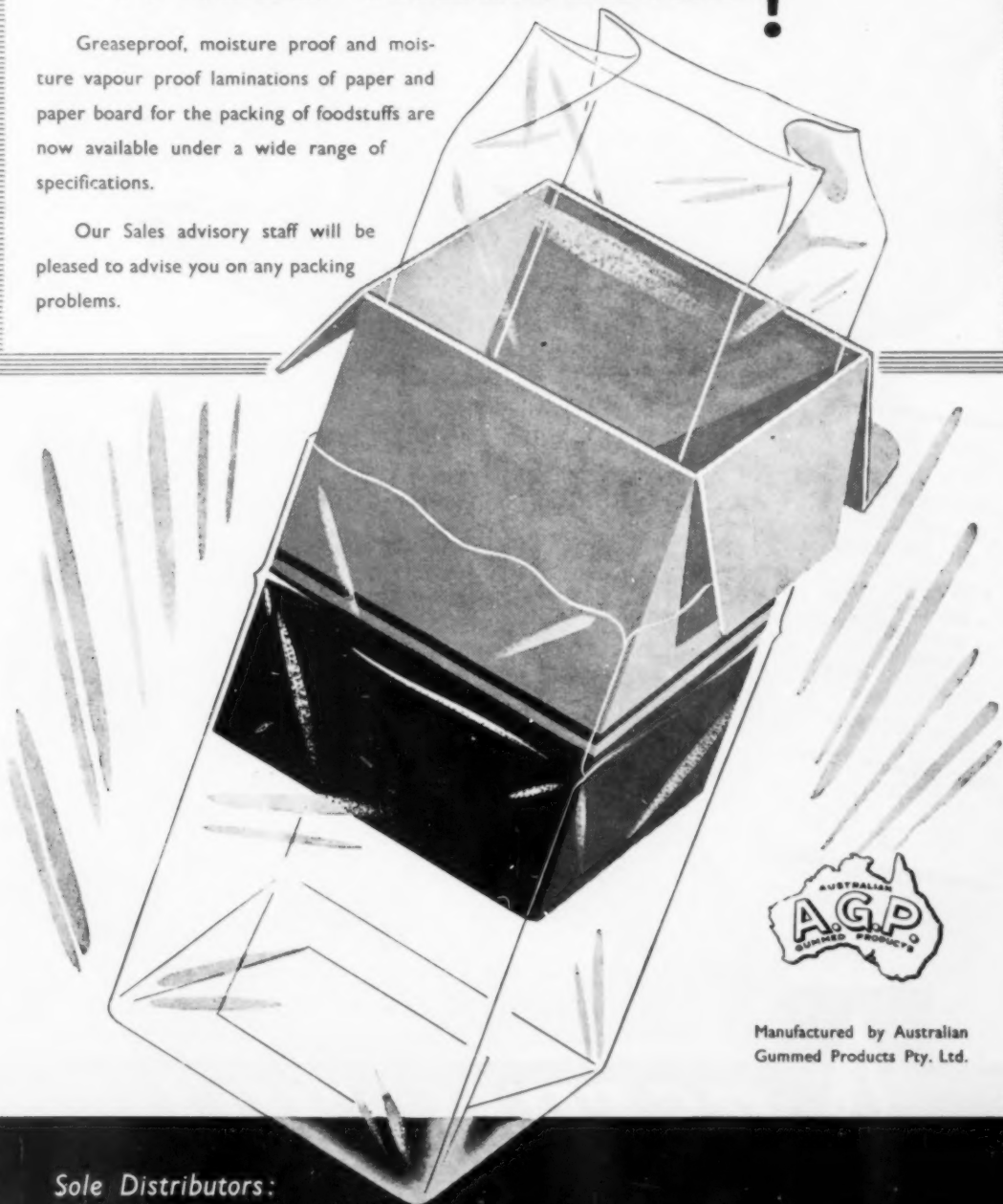
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Greaseproof, moisture proof and moisture vapour proof laminations of paper and paper board for the packing of foodstuffs are now available under a wide range of specifications.

Our Sales advisory staff will be pleased to advise you on any packing problems.



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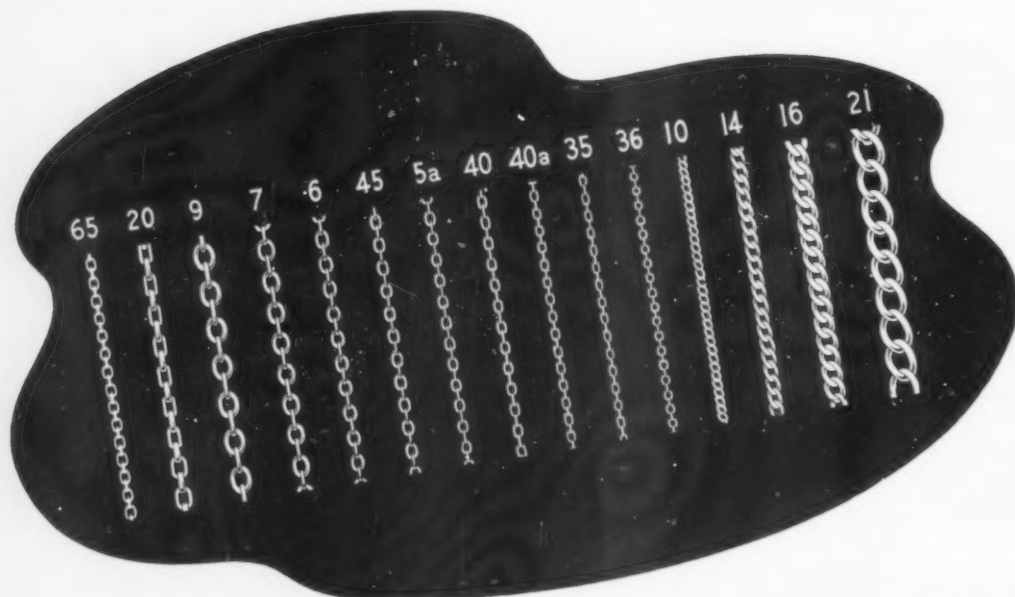
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- CHAIN  
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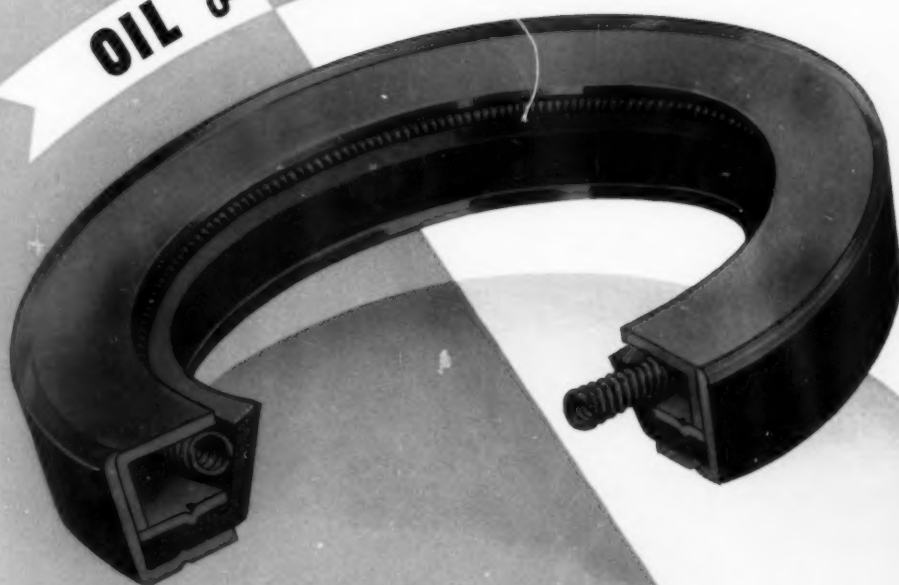


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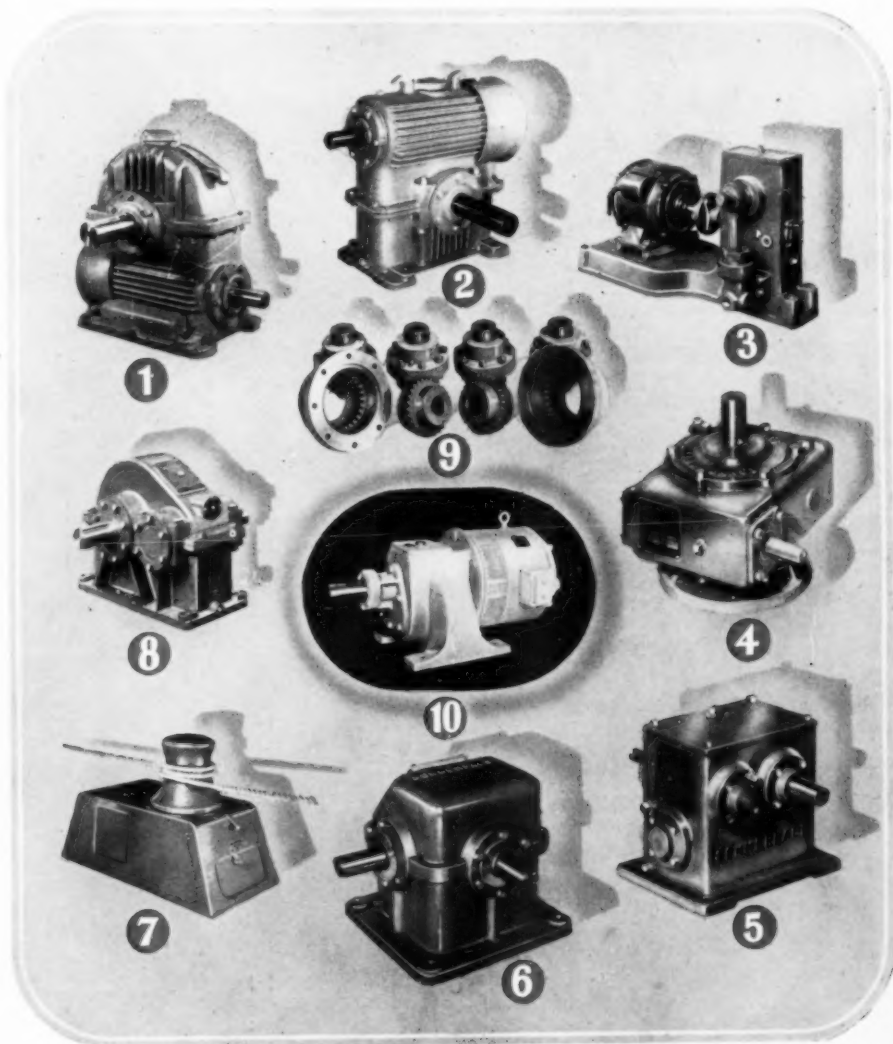
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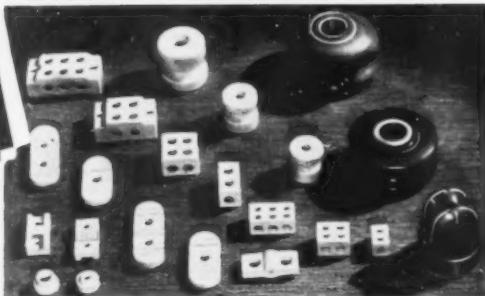
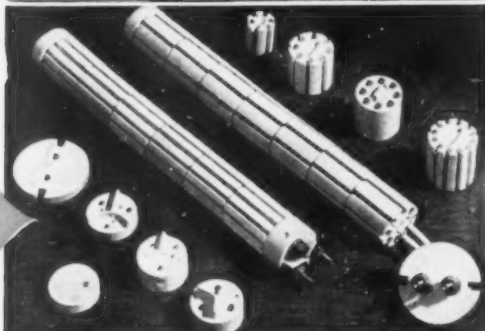
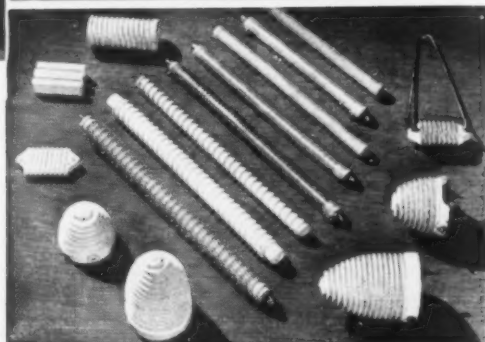
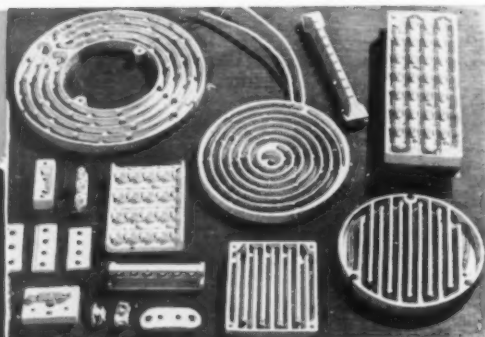


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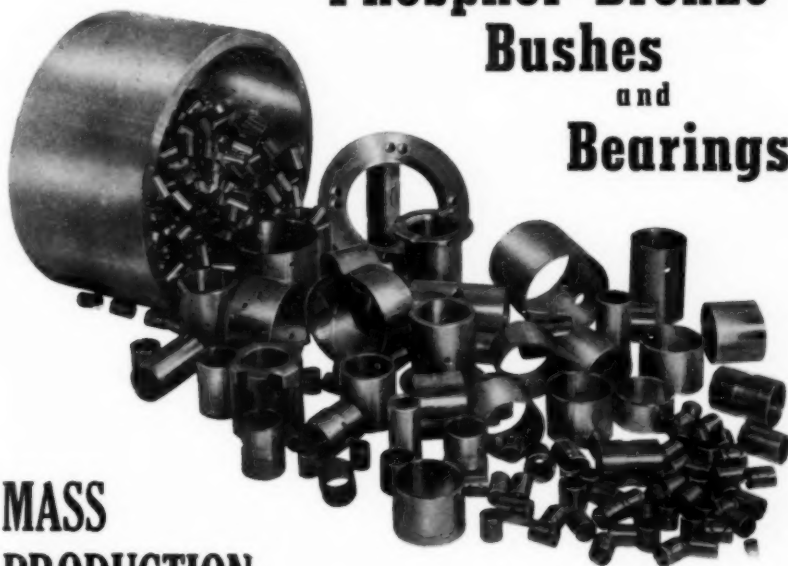
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# TREVOR BROS

## SINGLE RESPONSIBILITY FROM COAL HOPPER TO STACK

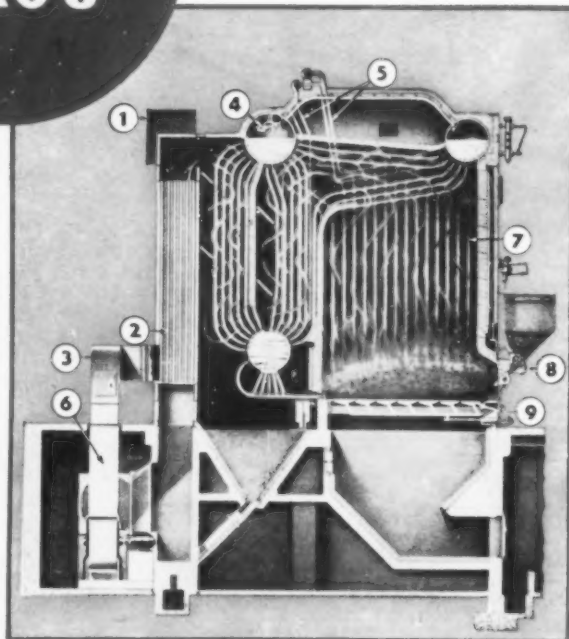
### TREVOR BROS.

Stokers are built for following feed

#### CAPACITIES:—

- 6": 400 lb. coal per hour.
- 10": 1,000 lb. coal per hour.
- 16": 1,500 lb. coal per hour.
- 24": 5,000 lb. coal per hour.

One or more UNITS  
FITTED according to  
BOILER CAPACITY.



Floor Line Setting as desired with or without Water Walls.

1. Trevor Bros. Breechings.
2. Trevor Bros. Air Preheater.
3. Trevor Bros. Air Duct.
4. Trevor Bros. Internal Steam Washer.
5. Trevor Bros. 2 Stage Superheater.
6. Trevor Bros. Induced Draught Fan.
7. Trevor Bros. Header Type Water Walls.
8. Trevor Bros. Superspread Stokers.
9. Trevor Bros. 16" Special Dumping Grates.

The "Trevor Bros." Stoker-Boiler Unit incorporates all of the important features of design and construction characteristic of equipment manufactured by this Company. Low initial cost, high performance standards, rapid, unidirectional circulation, the most desirable superheater operating characteristics, maximum dependability—these were the major considerations in the design of the "Trevor Bros." Stoker-Boiler Unit.

Special features of the "Trevor Bros." Stoker-Boiler Unit include the following:—

Ring flow, unidirectional principle of circulation is employed. High flow production, hydrostatic head results from high elevation between upper and lower drums.

Rapid, positive circulation; large area of tube surface exposed to radiant heat; cross flow of gases over heating surfaces; effective arrangement of baffles; low flue-gas temperatures and close co-ordination of Boiler and Stoker—all these factors make high efficiencies possible. Dry steam assured at all ratings because steam is delivered to main steam drum above water level and passes through efficient "Trevor Bros." Internal Steam Washer. Large amount of tube area exposed to radiant heat and rapid, unidirectional boiler circulation combine to handle wide fluctuations in load. Quick, positive circulation minimises boiler maintenance. Refractory maintenance greatly lessened through use of water walls. Compact design of "Trevor Bros." Stoker-Boiler Unit makes it readily adaptable to existing boiler rooms where space, especially height, is at a premium.

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We manufacture Underfired Multitubular, Water-Tube, and Vertical Boilers of all types with steam output ranging from 100 lb. to 25,000 lb. of steam per hour and pressures up to 200 lb. per square inch. Complete installations designed and installed to meet every condition.

## TREVOR BOILER AND ENGINEERING CO. PTY. LTD.

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Telephone: FJ 5125 (3 lines)

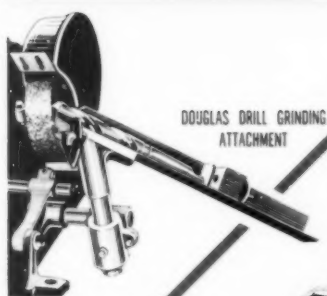


MOTORS • GENERATORS

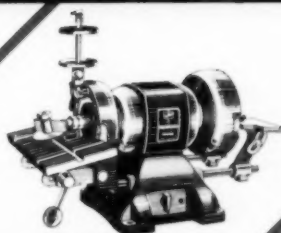


GRINDERS • BUFFERS

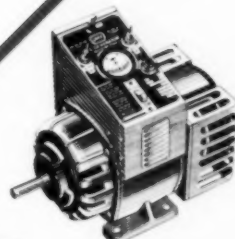
*in the smaller ratings*



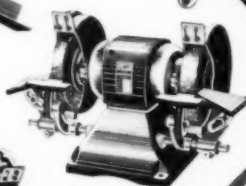
DOUGLAS DRILL GRINDING  
ATTACHMENT



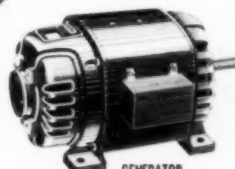
DIAMOND WHEEL  
GRINDER



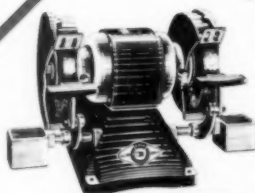
GENERATOR  
300W—12V  
400W—32V  
Type D6224



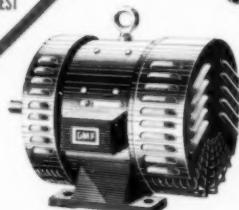
8" DOUBLE TOOLREST  
GRINDER



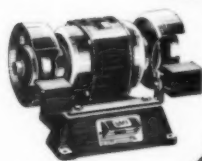
GENERATOR  
750W—32V Type D165  
1000W—32V Type D166



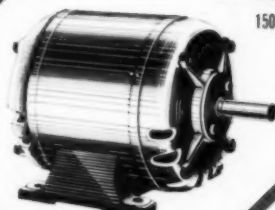
8" STANDARD  
GRINDER



1500W—2000W GENERATOR  
TYPE D283

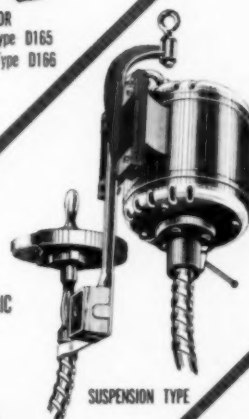


6" GRINDER

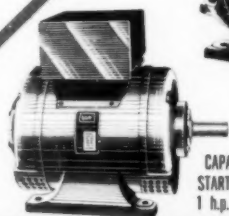


SPLIT PHASE MOTOR  
 $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{3}{4}$  h.p.

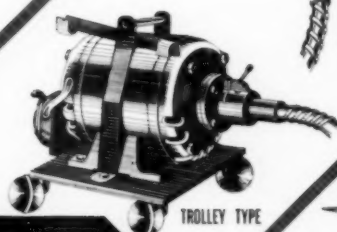
FLEXELECTRIC



SUSPENSION TYPE



CAPACITOR  
START MOTOR  
1 h.p.—1½ h.p.



TROLLEY TYPE



BUFFER  
1 h.p. Single Phase  
1½ h.p. Three Phase  
2 h.p. Three Phase

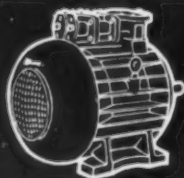


FLEXELECTRIC TRIPOD TYPE

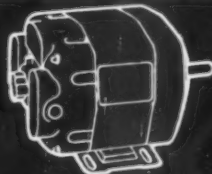
Please address your interstate enquiries to—  
QLD.: Electrical Agencies, 104 Edward St., Brisbane.  
VIC. & TAS.: Harold Beer, 364-372 Lonsdale St.,  
Melbourne. S.A.: R. A. Haynes, 20 Franklin St.,  
Adelaide. W.A.: Carlyle & Co. Ltd., 915 Hay St., Perth,  
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generators only). N.S.W.: Grinders and Buffers—Paul  
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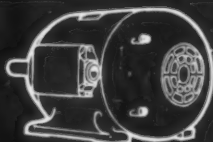


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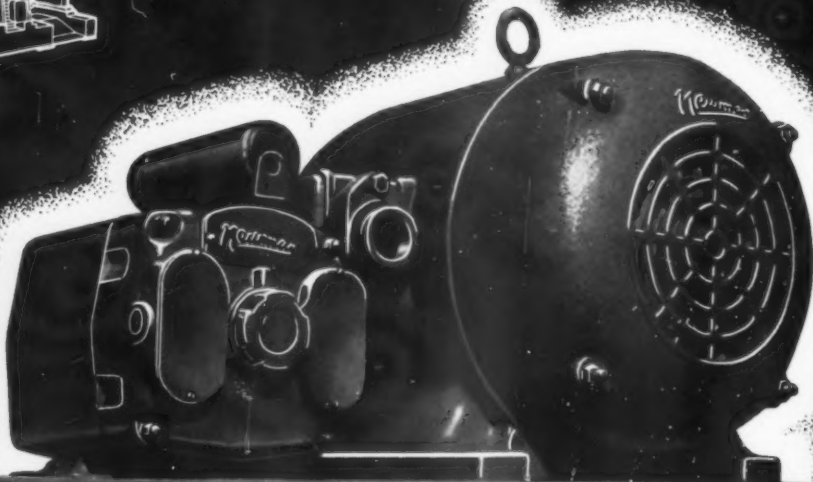
ALTERNATORS



INDUSTRIAL



SWITCHGEAR



**Newman**

TOTALLY  
ENCLOSED

FAN-COOLED ELECTRIC MOTORS  
SWITCHGEAR AND ALTERNATORS

NEWMAN INDUSTRIES LTD. YATE, BRISTOL, ENGLAND



Newman Motors are now operating efficiently in every Australian State—and at a price that more than competes with that of any totally enclosed motor. The following are features of the Newman range:—

The NEWMAN IMP is the most advanced Fractional motor available to industry.

Split Phase	50 cycles	1/12	1/8	1/6	1/4	at 925 r.p.m.
		1/6	1/4	1/3	1/2	at 1420 r.p.m.
Capacitor Start	50 cycles	1/12	1/8	1/6	1/4	at 925 r.p.m.
		1/6	1/4	1/3	1/2	at 1420 r.p.m.
Two & Three Phase	50 cycles	1/8	1/6	1/4	1/3	at 925 r.p.m.
		1/4	1/3	1/2	3/4	at 1420 r.p.m.

Available also for 40 cycles at a speed of 1140 r.p.m.

Can be supplied with either Ball Bearings or Self-Lubricating Sleeve Bearings for silent running, flanged or resilient mounts.

The NEWMAN INDUSTRIAL LINE OF MOTORS—totally enclosed, fan-cooled—offers a complete choice of sizes within the specific range it covers to 25 h.p. Supplied either Foot or Flange mounted.

NEWMAN FLAMEPROOF MOTORS are fully Buxton certified, will operate in Groups I, II and III gases, are available in either fan-cooled or natural-cooled design, and are either flange or foot mounted.



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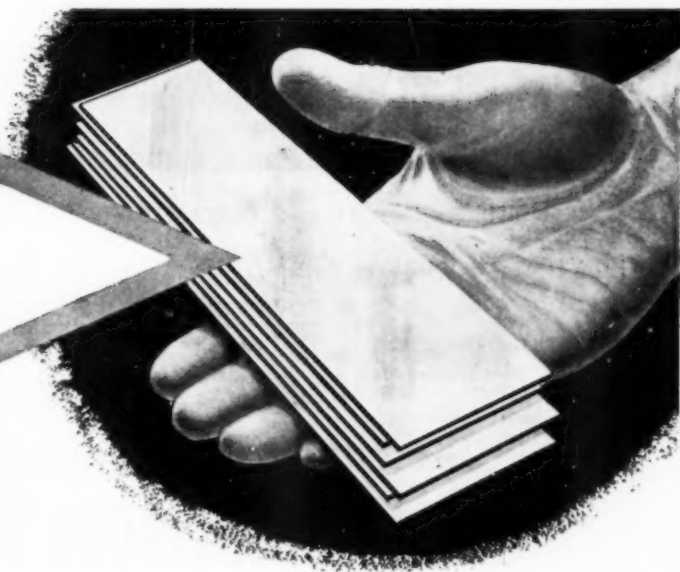
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MELBOURNE MB 1351





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It may be blood-stained, telling a story of war and of Brownbuilt Steel Equipment that went on active service with Australian troops.

It may tell a story of the effective housing and efficient control of stores and supplies in the many miles of Brownbuilt Shelving supplied to Australian industry.



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But whatever the story, it is a story of steel fashioned by skilled Brownbuilt craftsmen, with modern production "know-how," into utilities to serve Australian needs—utilities that add to the appearance, orderliness and efficiency of thousands of Australian offices, factories and stores.

And every day, just pieces of steel become another story—another story in the history of the Brownbuilt Steel Equipment Co., who serve *your* needs more comprehensively and better than ever before with complete production facilities in both Sydney and Melbourne.

THE WORLD SHORTAGE OF STEEL continues, due to its growing popularity (particularly steel sheets.)

Brownbuilt, however, has protected your interests by importing large quantities and, although this costs nearly double local steel price, are still able to offer Equipment at the most competitive prices relative to its incomparable value.

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For supplying Chilled Water at Temperatures from 40° F. to 50° F.



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Axial Flow, Mixed Flow, Single and Multi-stage, of highest quality and efficiency, for water, sewage, gravel, slum, paper pulp, sugar juices, oil and chemicals.

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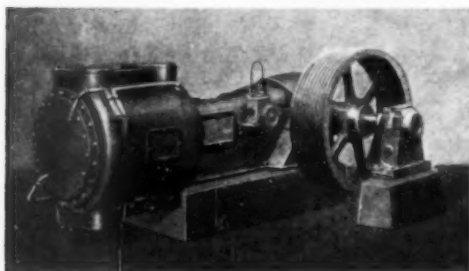
Vertical, Horizontal and Angle type for all capacities and pressures.

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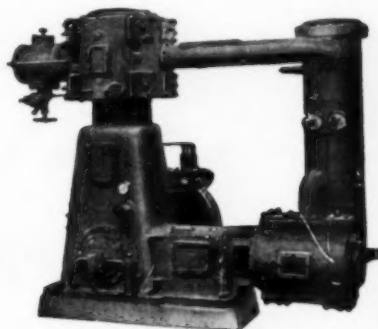
Horizontal Type with feather valves, for medium and large capacities.

**WELDED PRESSURE VESSELS**

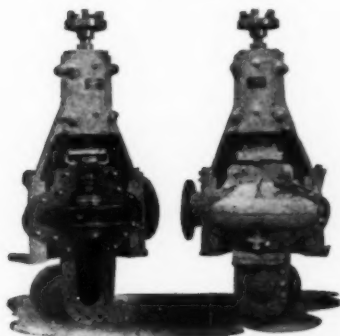
**— CLASS A1 AT LLOYD'S**



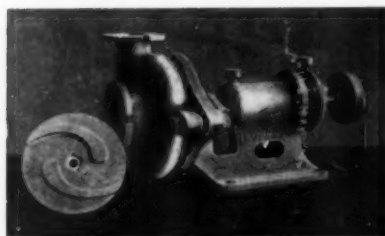
20in. x 10in. Dry-Vacuum Pump.



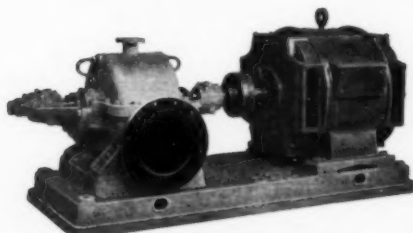
Angle Type Air Compressor.



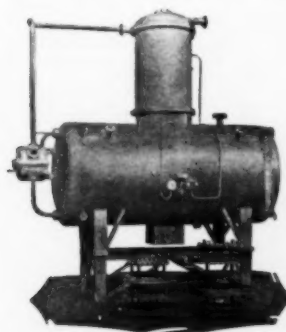
Vertical Spindle Split Casing Sewage Pumps.



"J.M.S." Pump for Handling Slum, Etc.



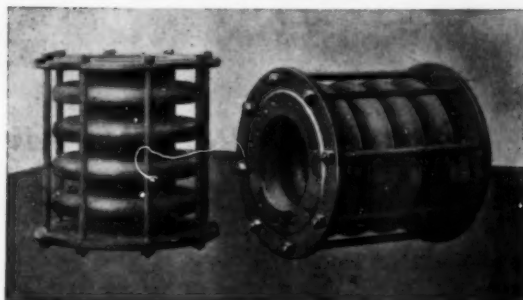
12in./8in. Condensate Extraction Pump.



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Expansion Bellows for a 12in. diameter Steam Pipeline.



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CASTLEMAINE AND WILLIAMSTOWN, VICTORIA

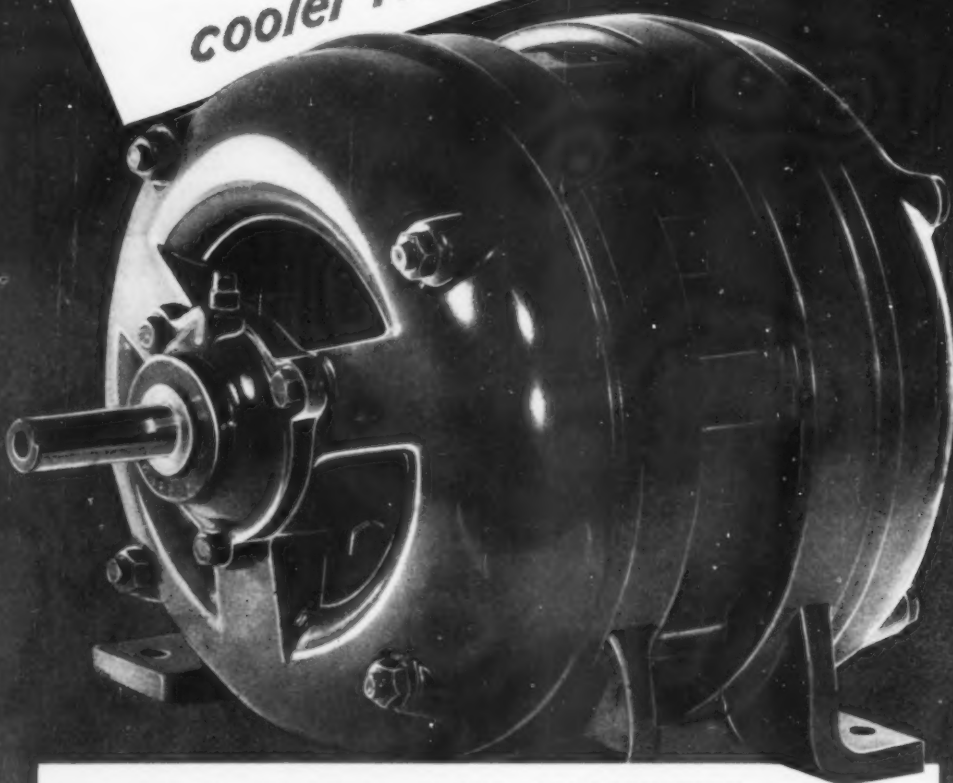
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AGENTS IN ALL STATES



# "LINC-WELD"

*The Reserve power*  
*cooler running* **MOTOR**



## FEATURES ALL-STEEL FRAME CONSTRUCTION

Here's why "Linc-Weld" all-steel frame motors are proved to run cooler . . . why they have a greater margin of reserve power to withstand overloading . . . why you can expect from them high performance efficiency and power factor and longer operating life. Through the greater strength and rigidity of welded steel construction, "Linc-Weld" motors have

roomier frames than conventional cast iron motors of equivalent size. Roomier frames mean more space for more copper and iron . . . more space for air circulation giving faster heat dissipation.

Made to N.E.M.A. standards electrically, "Linc-Weld" rigid rolled steel frame motors are built to deliver more power, to do more work, to give longer service.



### "LINC-WELD" RANGE

$\frac{1}{2}$  h.p. to 25 h.p.  
415 volt, 3 phase, 50 cycles

*Product of over fifty years' experience in motor design and construction*

## THE LINCOLN ELECTRIC COMPANY (AUSTRALIA) PTY. LTD.

109 EUSTON ROAD, ALEXANDRIA, N.S.W. LA1288, LA5187

And at Sydney, Melbourne, Adelaide, Brisbane, Perth, Launceston, Newcastle and Wollongong.





### 39 YEARS OF LEADERSHIP

TIME is the factor which proves the standard and enterprise of any business organisation. . . . .

Since 1911, Akubra Hats have scored brilliant successes with dealers and customers all over Australia - through these years of changing conditions the name Akubra has been constantly synonymous with Quality. . . . .

Yes, Sir! Akubra makes the finest Fur Felt Hats. . . . . best hats in the World today.



# AKUBRA

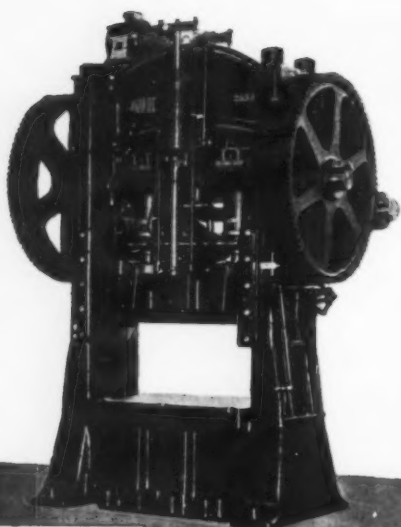
*hats of Quality*



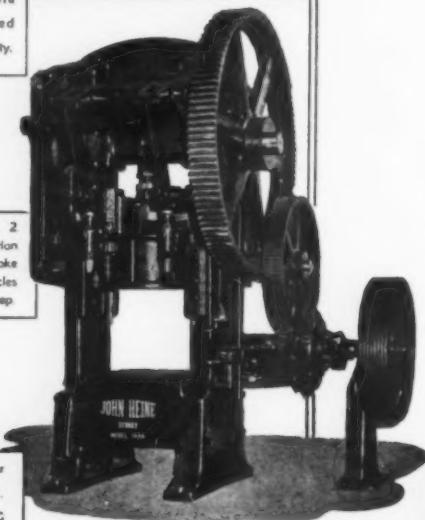
*Australia's finest Quality Fur Felt Hats*



# JOHN HEINE MANUFACTURERS



Model 255A Double  
Crank Straight Sided  
Press, 200 tons capacity.



Model 145A Series 2  
Toggle Double Action  
Drawing Press. Stroke  
capable of drawing articles  
up to 24 1/2 inches deep.

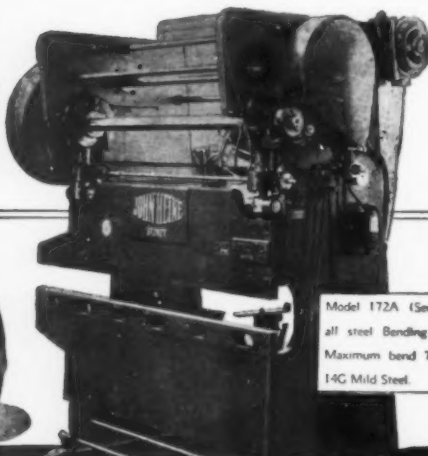
Model 108B Power  
Geared Guillotine.  
Capacity 98in. x 10G  
Mild Steel.



FOUNDED in 1886, the firm of John Heine & Son Pty. Ltd. now manufactures a comprehensive range of Sheet Metal Machinery, Tin Box and Canister Making Machinery, Automatic Can Making Equipment, and Precision Die Sets. Where required, we can offer complete plans for the manufacture of Sheet Metal Products.

Some of the machines we manufacture are illustrated herewith. These machines represent a cross section of our products.

Should further details of any of our machines be required, may we suggest that you write or call at our Head Office in Sydney or any of our representatives' offices in the States of Australia, or in the principal cities of New Zealand. We would be only too pleased to answer your inquiries.



Model 172A (Series 11)  
all steel Bending Press.  
Maximum bend 72in. x  
14G Mild Steel.

# JOHN HEINE

Allen Street, Leichhardt, Sydney, N.S.W.

Telegraphic Address: Heineson, Sydney

Telephones LM 1444, 4627, 4588



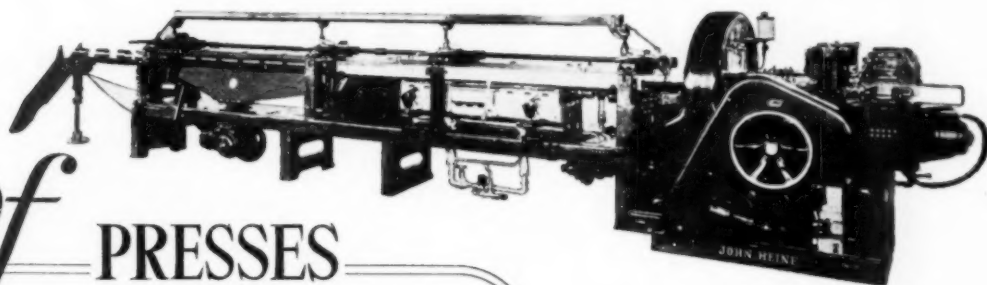
*of* PRESSES

GUILLOTINE SHEARS

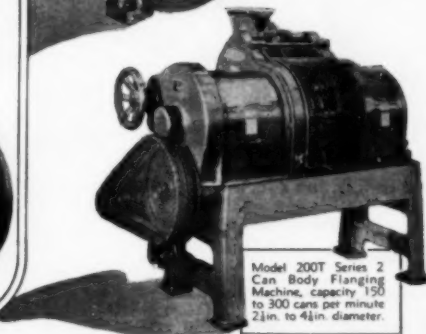
SHEET METAL WORKING  
MACHINERY

CAN MAKING  
MACHINERY

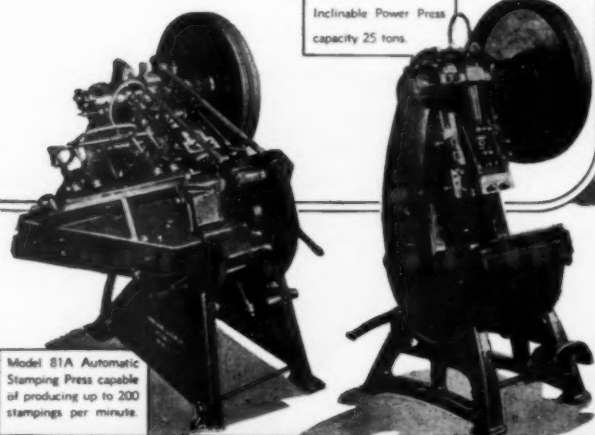
PRECISION DIE SETS



Model 200G Series 2  
High Speed Automatic  
Can Body Forming Mach-  
ine, capacity 150 to 300  
cans per minute 2½in. to  
4½in. diameter.



Model 200D Series 11  
High Speed Can End Seam-  
ing Machine, capacity 150  
to 300 cans per minute  
2½in. to 4½in. diameter.



Model 203A Series 2  
Inclinable Power Press  
capacity 25 tons.

Model 81A Automatic  
Stamping Press capable  
of producing up to 200  
stampings per minute.

Model 200T Series 2  
Can Body Flanging  
Machine, capacity 150  
to 300 cans per minute  
2½in. to 4½in. diameter.

**JOHN HEINE**  
SYDNEY

**& SON PTY. LTD.**

In Melbourne, Adelaide and Perth  
In Brisbane  
In New Zealand

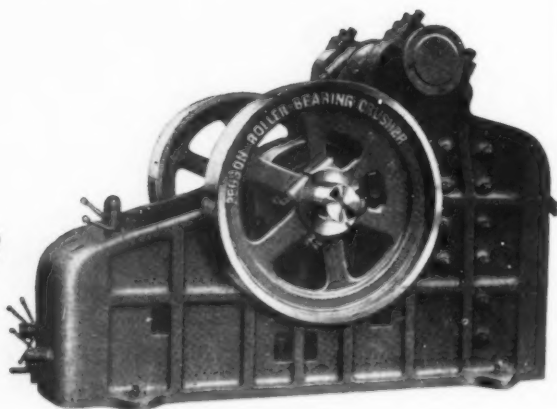
Representatives

McPHERSON'S LTD.  
ENGINEERING SUPPLY CO. OF AUST. LTD.  
JOHN CHAMBERS & SON LTD.



# CRUSHING!!

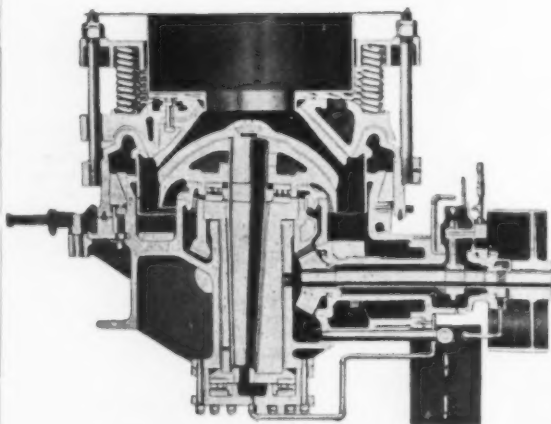
**STONE, ORE  
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*crushed and  
screened BETTER*  
with  
**PEGSON-TELSMITH  
EQUIPMENT**



## PRIMARY CRUSHER

For First Reduction

- Double or Single Toggle;
- Self-aligning Roller Bearings;
- From 12" x 8" to 60" x 48";
- One-piece All-steel Frame.



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Single, Double or Triple Deck

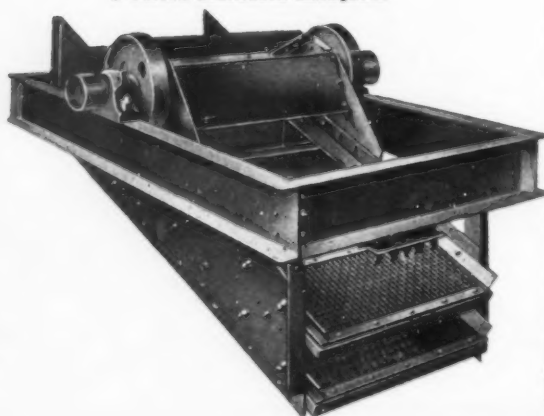
- Robust Vibrating unit;
- Roller Bearings throughout;
- Perfect balance;
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## For TOP TONNAGE

consult

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Secondary Crushers

- Unlimited Choke Feed;
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Commonwealth Distributors for  
**NUTTALL ENGINEERING PTY. LTD.**

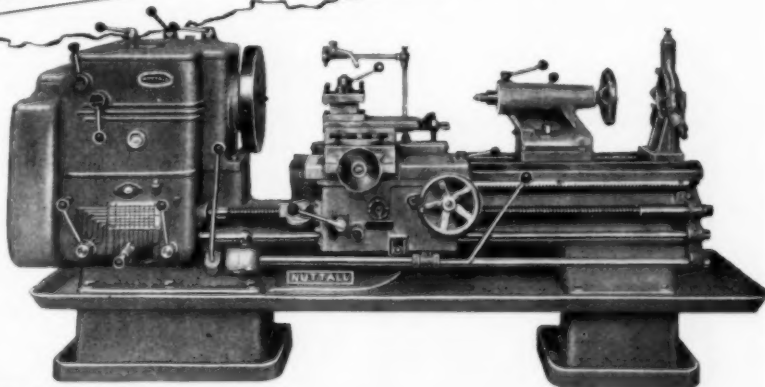
*invite your inquiry for*

**NUTTALL**

**PRECISION ENGINEERED LATHES**

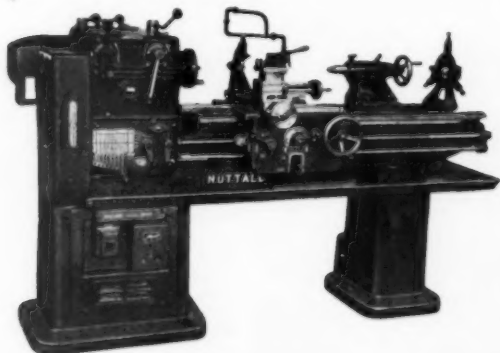
## 8 1/2" CENTRE 20" SWING ALL GEARED HEAD LATHE

★ Surfacing, sliding, screwcutting ★ Admits 48", 72", 96" between centres. Six models ★ 12 spindle speeds, 13 to 620 r.p.m. ★ Timken taper roller bearings—hollow spindle admits 2 1/2" diam. ★ Headstock gears are chromium nickel steel ★ Norton-type gearbox, 48 threads and feeds ★ Built to Schlessinger limits



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★ Height of centres 6 1/2"—admitting 40" between centres ★ 12 spindle speeds from 6 to 750 r.p.m. ★ Precision Timken roller bearings ★ Norton-type gearbox, 48 threads and feeds ★ Built to Schlessinger limits



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**Qualos LATHES**

- ★ A QUALITY RANGE OF SMALL LATHES.
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CHUCKS AND ALL MACHINE TOOL ACCESSORIES AVAILABLE FROM STOCK.



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- Send for descriptive leaflet giving details and specifications.



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THE AUSTRALASIAN

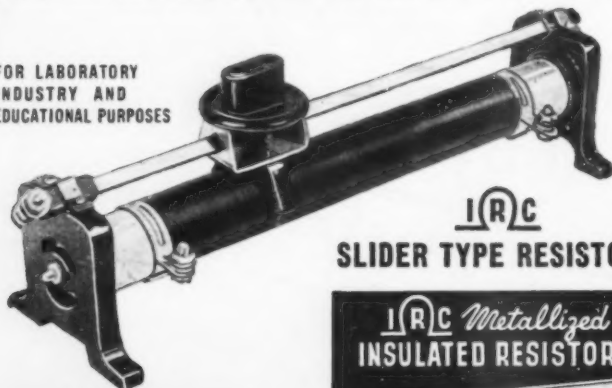


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# IRC *make*

- more different types
- more different shapes for
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**IRC**  
SLIDER TYPE RESISTORS

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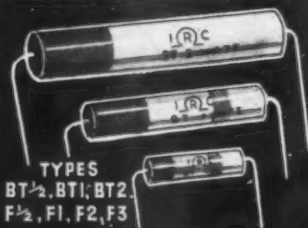
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WHERE EXTREMELY HIGH ACCURACY  
IS DEMANDED



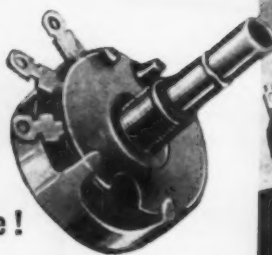
**IRC**  
*Precision*  
WIRE WOUND  
RESISTORS

**IRC** Metallized  
INSULATED RESISTORS



TYPES  
BT $\frac{1}{2}$ , BT1, BT2,  
F $\frac{1}{2}$ , F1, F2, F3

**Noise**  
hasn't a  
chance!



The exclusive IRC silent spiral connector and the famous IRC knee-action silent element contact give DOUBLE assurance of the quietest, most dependable Volume Controls.

**IRC** VOLUME CONTROL



**UNEQUALLED  
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under the most severe conditions. Built to withstand overloads, intense heat, dampness — even salt water immersion.

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for ACCURATE temperature reading

# ROTOTHERM

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for all industrial and domestic use



DOMESTIC OVEN DOOR TYPE



CO-AXIAL MODEL (TYPE C)



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HANGING TYPE FOR DOMESTIC REFRIGERATORS, ETC.



"NELSON" DOMESTIC WALL TYPE, IN BAKELITE



"MERTON", FOR DESK OR MANTEL-SHELF, IN BAKELITE



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PIPE LINE MODEL, FOR INSERTING INTO PIPES

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REG. TRADE MARK

# Supplying a Nation with CHAINS

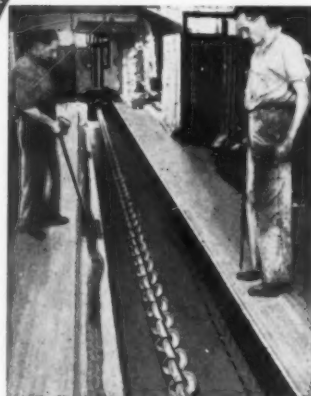
AUSTRALIAN made F.M.C. Chains are obtainable in types and sizes to meet the industrial and shipping requirements of this country. Modern machinery and highly skilled tradesmen, combined with the most rigid standards of testing, make F.M.C. Chains outstanding for reliability and efficiency.

Contrast in F.M.C. Chains. At Left: Special Drive Chain, 20 ft. 6 in. long, weight 9 cwt. Minimum breaking load, 200 tons. Centre: 1 1/2 in. Pitch Transmission Chain. At Right: 6 in. Pitch Roller Chain.



Right: View of the F.M.C. Testing House, with control room in the background, showing chain undergoing test.

Left: F.M.C. Chain being electrically welded. This welding machine is a typical example of the modern plant used to produce F.M.C. Chains.



## High Standard of F.M.C. Anchor & Mooring Chain Cable Maintained by Rigid Tests

Before any F.M.C. Chain leaves the works it must pass through the F.M.C. Testing House. This is equipped with an Avery Testing Machine capable of testing, in one pull, chains of any length up to 15 fathoms (90 feet) and of applying a strain of up to 100 tons 16 cwt. Official Lloyds certificates can be obtained, if required, covering chains tested on this machine. If desired, buyers of F.M.C. Chain may be present while tests are made.

Enquiries are invited for Machined Steel Conveyor and Elevator Chains and all types of Attachments; Roller Chain for Power Transmission, etc.; Oven Chains; Chains for Sugar Mills; Wool Drier Chains; Sprockets, Tested Cable, Anchor and Stud Link Chains, Shackles, Hooks, Links, Rings, and Chain Slings, etc. All types of shipping and Lifting Gear reconditioned and tested.

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PROPRIETARY LIMITED  
**CHAIN MANUFACTURERS**  
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Phone 40-658 N.Z.

THE NELSON TRADING CORPORATION LTD. 11 Elphinstone Circle, Bombay, INDIA





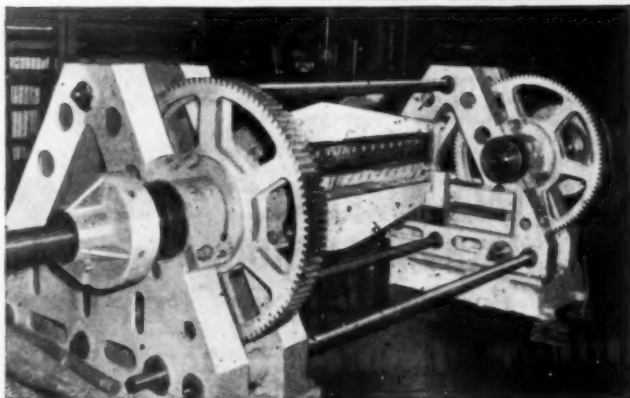
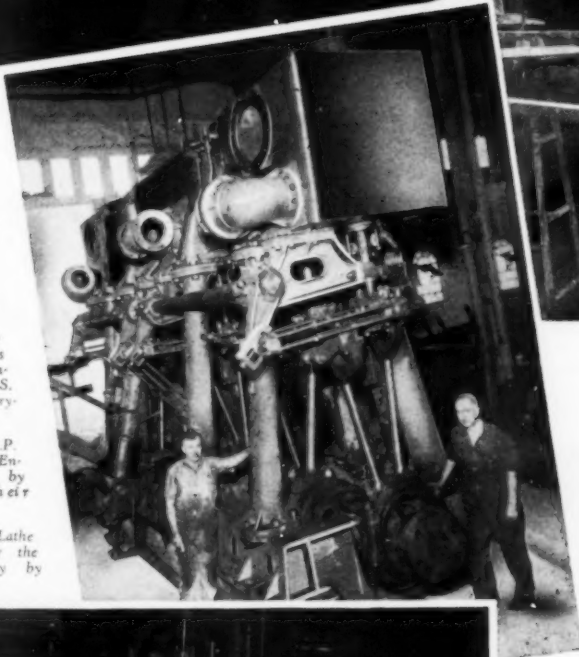
*For every description of*  
**MECHANICAL,  
 STRUCTURAL STEEL &  
 MARINE ENGINEERING**



Above Right: Sargeant's Engineers carrying out extensive repairs to S.S. "Elsanna" in Dry-dock.

Centre: 1000 H.P. Triple Expansion Engine constructed by Sargeants in their Brisbane Works.

Below: Veneer Lathe manufactured for the plywood industry by Sargeants.



AS one of Brisbane's oldest established and largest engineering works we have pioneered and developed the manufacture of many types of Marine Machinery. We have also been associated with many of Queensland's biggest construction jobs, including structural steelwork for buildings and bridge fabrication and sugar mill, butter factory, meatworks and other industrial machinery.

**Manufacturers of:**  
 Machinery and Equipment for Sugar Mills, Meatworks, Butter Factories and Mines. Cast Iron Piping, Valves and Fittings for Water Supply. Tanks, Vats and Coils. Pressure Vessels. Cranes. Smoke Stacks. Storage Tanks. Steel Buildings. Castings of every description in Iron, Steel, Gunmetal, Brass and Aluminium.

*If you have an Engineering problem of any kind, let us solve it for you.*

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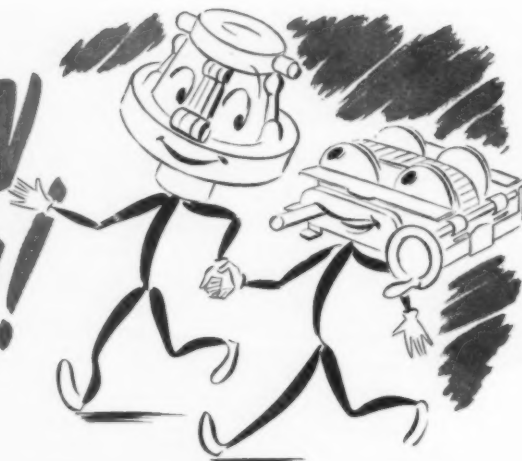
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**ALICE, ALBERT and  
 MARGARET STREETS  
 BRISBANE, Q.**



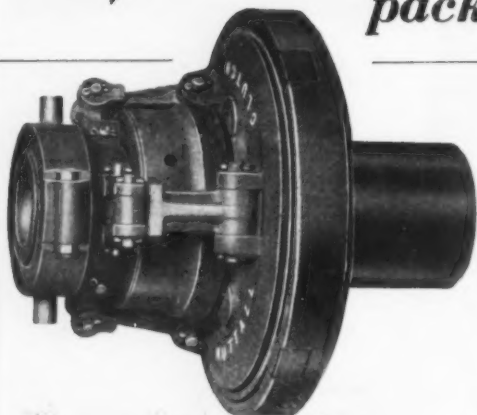
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TRANSMISSION  
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**NUTTALL**

**WORKING COMPANIONS**

*packed with power and drive!*

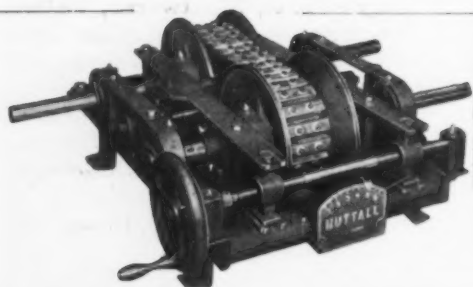


## NUTTALL FRICTION-DISC CLUTCHES

*The answer to your stop and start problems*

There is a NUTTALL friction-disc clutch for practically every purpose where rotary power must be connected and interrupted! NUTTALL clutches, Australian made, are sturdy, reliable and powerful. Let us show you the answer to your problem of "stop-and-start"—WRITE, OR PHONE FF 1291, FOR DETAILED CATALOGUE.

NUTTALL friction-disc clutches are made in sizes and ratings from fractional to 300 h.p.; variety of mountings and housings make them extremely adaptable. Clutches may be supplied standard with plain bearings, or with bronze bushes or ball bearings, according to requirements.



## NUTTALL VARIABLE SPEED TRANSMISSIONS

*For stepless adjustment of speed (between predetermined limits)*

Designed for use where stepless adjustment of speed between predetermined limits is necessary, NUTTALL variable-speed transmission units are manufactured in a wide variety of sizes, capacities and ratios. Compactly designed and precision-made in Australia to Nuttall standards, they will give positive drive and long, trouble-free service. WRITE, OR 'PHONE FF 1291, FOR DETAILED CATALOGUE.

NUTTALL variable-speed transmissions are made in 15 sizes, from fractional to 150 h.p. capacity. The unit may be fixed to floor, wall or ceiling, or incorporated as part of the driven machine. Control is by simple hand-wheel, or may be by automatic or remote control.

# NUTTALL ENGINEERING PTY. LTD.

9 PRIMROSE AVENUE, ROSEBERY, N.S.W. 'Phone: FF 1291

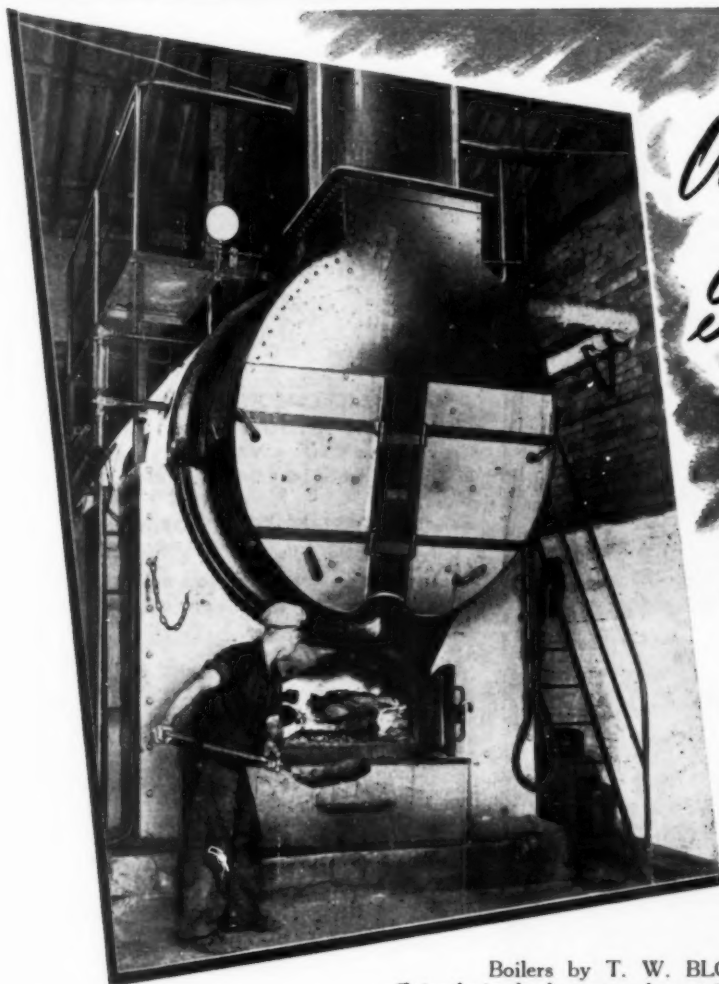
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N.S.W.: Modern Tools Pty. VIC.: Gardner, Waern & Co. Ltd., Primrose Avenue, Pty. Ltd., Flinders Street, Rosebery, N.S.W. Melbourne (and agents).

QLD.: British General Electric Co. Pty. Ltd., Brisbane. S.A.: Harris, Scarfe Ltd., Grenfell Street, Adelaide.

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*Our Customers  
are all  
Steamed Up!*

IN factories and workshops where manufacturing processes require a constant and dependable supply of live steam, efficient boilers are of vital importance. Breakdowns can be too costly in time and money.

Boilers by T. W. BLOOMER are keeping steam up efficiently in the largest and most important plants in Queensland—and in many smaller and less important ones, too. Wherever installed—and whether wood, coal or oil fired—T.W.B. Boilers give lasting satisfaction, for they are as good as long experience, technical skill, up-to-date machinery, and the most exacting standards can make them.

Enquiries are invited for all types of New and Second-hand Boilers, from one-half to one hundred horsepower. Electrical Steam Boilers in all sizes. Bloomer's Colonial Type Patent Rivetless Boilers (Electrically welded throughout).

Agents for Oil Burner Equipment Co. Pty. Ltd., Newtown, N.S.W.

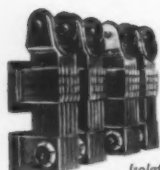
The illustration above shows one of two Colonial type boilers completely rebuilt and installed by T. W. Bloomer in the Brisbane Factory of R. M. Gow & Co. Pty. Ltd., Food Manufacturers. Specifications: 14 ft. long by 6 ft. 6 ins. Diameter; 60 x 4 in. common tubes; 2 x 3 in. lock-up Safety Valves; 120 lbs. working pressure; heating surface, 880 sq. feet; 55 H.P.

**T.W.BLOOMER**  
**Boiler Maker**

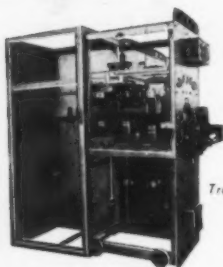
Phone. J2203  
OFFICE & FACTORY  
**BALACLAVA STREET, WOOLLOONGABBA, BRISBANE, Q.**



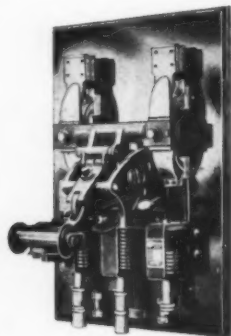
# Specialists in Electrical Protection



Isolating Switch



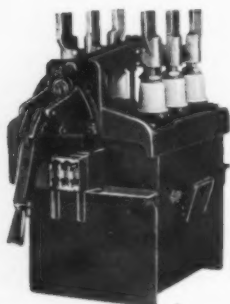
Truck-type Cubicle



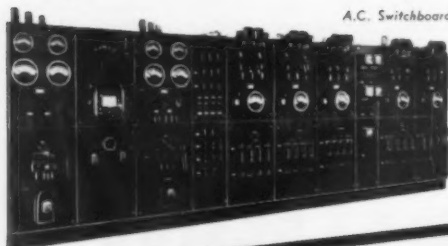
Air Circuit Breaker



Oil-Immersed Switch



Oil Circuit Breaker



A.C. Switchboard

## OIL CIRCUIT BREAKERS

200 to 3,000 amp. 415 volt.  
30 MVA. breaking capacity  
200 to 600 amp., 11kV.

## AIR CIRCUIT BREAKERS

100 to 3,000 amp. A.C. 415  
volt to 30 MVA. breaking cap.  
100 to 12,000 amp. D.C.

## CURRENT TRANSFORMERS

for metering and protection.  
Indoor switchboard mountings  
and portable precision types.



**KNIFE SWITCHES AND  
INDOOR ISOLATORS**  
to 12,000 amp.

**INSTRUMENT TRANSFER  
SWITCHES**

**SWITCHBOARDS AND  
SWITCHBOARD ACCESSORIES**

**HIGH CONDUCTIVITY  
ELECTRICAL CASTINGS**

**B&S Electrical Pty. Ltd.**  
**SWITCHGEAR SPECIALISTS**

240 LAWRENCE STREET, ALEXANDRIA, N. S. W.



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HOBART  
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DIVISION OF ELECTRICAL EQUIPMENT OF AUSTRALIA LTD.





# Foreword

By the Rt. Hon. R. G. MENZIES,  
K.C., M.P.,  
Prime Minister of Australia

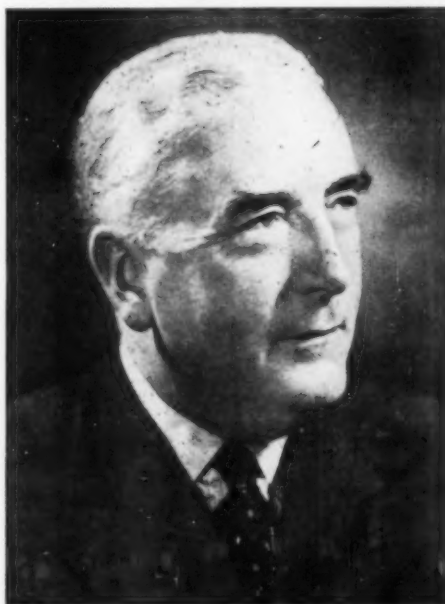
THE Australian manufacturer has a great part to play in Australian development. The opening up of national resources and the building of industries need team-work. We must all play in the team, if we are to be true and good Australians. In a team, each helps all the others, and is in turn helped by them.

Manufacturing in Australia has long passed the experimental stage. It is one of the great elements in our economic life. It deserves our help, by tariffs and otherwise, so that Australia can become a large supplier of manufactured goods, not only to herself, but to the markets of the world.

But Australian manufacturing has also national duties. It must watch its costs and its efficiency, bearing in mind that the purpose of a tariff is to guarantee employment and fair competition, not to create a monopoly.

I know that the Annual Number of "The Australasian Manufacturer" never loses sight of this. Nevertheless, I venture to repeat it; to say how much I wish for the day when the products of our factories are as much demanded abroad as are the products of our farms

and stations; and to remind everybody concerned that in the securing of a market in another country, quality, price, and consistency of sound delivery are the conditions of success.



The Rt. Hon. R. G. MENZIES K. C., M. P.  
Prime Minister of Australia



## TYPICAL SPECIAL PIECES

ALL THESE TYPES—with cut or rolled threads from 3/16in. to 1/2in. in diameter and up to 6in. long in headed pieces—have been made to exactly suit the purpose of a draughtsman, an engineer or a manufacturer.

We make in steel, copper, brass, aluminium, monel, etc., etc.

OUR TECHNICAL STAFF is available for consultation on design, production problems, cost reduction and improved performance in bolts, rivets, studs and fastening pieces.



A few of Steelcraft's products are:

**ALL THREAD SCREWS**

**AXLE PINS**

**BOLTS**

(special lengths & types)

**CASTING-IN SCREWS**

**DECK SPIKES**

**EYE BOLTS**

**FLANGED PIECES**

**FORGING BLANKS**

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# INTRODUCTION

By Latham Withall, Director Associated Chambers of Manufactures of Australia

It is an honour to be invited to contribute the Introduction to this issue of "The Australasian Manufacturer" which marks the Jubilee year of the Commonwealth of Australia.

At the end of the present year we shall have completed Fifty Years of Nationhood, for it was on January 1 of 1901 that we saw the inauguration of the Australian Commonwealth. Prior to that date we had a congeries of States going their separate ways, passing their separate laws (often in conflict with one another, as in the case of Border customs duties), and without any real, national binding force.

How different it is to-day! With the coming of Federation our outlook widened. It was not only that our interstate barriers fell away and we realised that, instead of the old separatism, we were one people with a common national destiny; but with this broader vision there was also born a new sense of our relationship with the outside world. Nationally and internationally the old "isolation" passed away; and the story of these last Fifty Years bears witness not only to our wonderful internal progress as a nation, but is also studded with numerous dramatic achievements in the sphere of external affairs.

THE impact of world events upon Australia has been tremendous. We have passed through two great World Wars, and for a nation that has only recently passed the eight-million mark in population we may take a justifiable pride in the contributions we have made in upholding the cause of freedom and civilisation.

It has cost us blood, and sweat, and tears. And it has cost us a Thousand Millions, and more, in money. On the other hand, it has won for us a proud place among the free nations of the earth; and it has turned the eyes of other peoples, torn and scathed and weary of war, to this new land which offers them a home and at the same time needs their help. Our need for people is great. It is true that we have made remarkable progress, but this is a country of almost unlimited resources, and if we are to develop it we must people it. If we are to hold it we must people it. Events are moving fast, and we are living in a world that has seen vast changes in the last few years. We live under the shadow of a mighty, restless "East"—a so-called Far East, which to Australia is the Near North—and we dare not ignore the menacing portents.

Politically, there are points of difference among us; but on this subject of population, the need for peopling our land, all political parties are at one. In the vigorous immigration policy which he pursued as a member of the Chifley Government, Mr. Calwell had the complete support of the Opposition which has since taken over

the reins of government, and that policy is being continued by Mr. Holt, the Minister for Immigration in the Menzies Government. It is, indeed, being intensified, and a target of 200,000 immigrants is

States, which will grow stronger with the years. In addition to the scores of thousands of American soldiers, airmen, and sailors, who came to our help in the time of need, thousands of American mu-

gross national product amounted to £949,000,000, and the total wages bill was £444,000,000. In 1948-49 the wages bill was no less than £1,055,000,000, and the gross national product amounted to £2,256,000,000.

These figures indicate the enormous progress that has been made in the last ten years. But we are living in a period of inflation, and the value of the £ is not what it was before the war. The Menzies-Fadden Government has promised to "put value back into the £"; but that is something which, as the Prime Minister told a questioner in the House of Representatives recently, cannot be done by any single legislative act. No one entertains that illusion. "We believe," said Mr. Menzies, "that value goes back into the £ when, by reason of a series of economic measures, the £ buys more. That touches upon the problem of the relation of production to purchasing power."

Production—and more production; that is what we need. And that means people—and more people!

This annual issue of "The Australasian Manufacturer," containing special articles contributed by leading Australian statesmen, scientists, industrialists and other prominent citizens, goes out to the people, far and wide. It goes to the United Kingdom, to the United States, and to many other countries. It carries the story of the strides this country has made in the last fifty years in many fields of endeavour and achievement.



Mr. L. WITHALL,  
Director, Associated Chambers of  
Manufactures of Australia.

the aim in this present year. Of these it is hoped that 100,000 will be obtained from the British Isles, for next to our own Australian-born children the best immigrants we can get are those who are born in other British countries.

To America, also, we are looking, both for immigrants and capital. The war created a bond between Australia and the United

nations experts and technicians came here, and there was a flow of U.S.A. capital to our great war industries. We want that flow to continue in times of peace.

Never have the workers in this country been so well off—except in this matter of housing, and that is all-important. The bank savings of the people have reached record dimensions. In 1939 the



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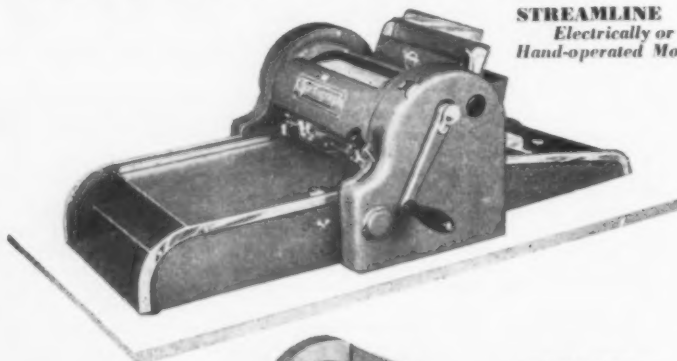
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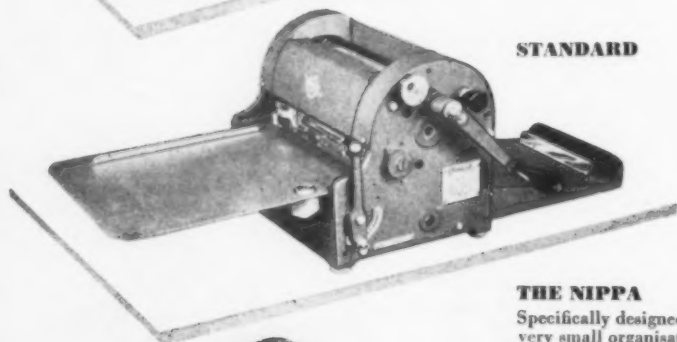
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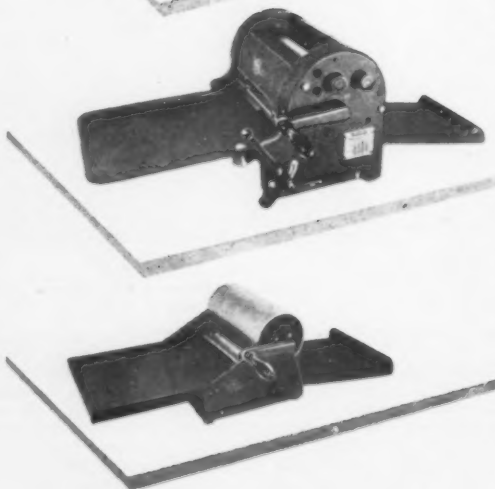


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# SERVING INDUSTRIAL AUSTRALIA

## "MANUFACTURER'S" RECORD OVER THREE DECADES

EACH succeeding year sees Australia attaining a position of added importance in the modern industrial world. She continues to increase the ambit of her manufacturing activities—establishing entirely new undertakings; bringing new lines into production; studying and acquiring the latest techniques; investigating overseas experience in new and improved employer-employee relationships; and applying to each and every department of her activities science and scientific principles.

"The Manufacturer" takes pride in this forward march, pride which is based on the firmest of firm foundations. For, throughout the thirty-four years of its existence, it has battled hard and forcefully to further the manufacturing developments to-day everywhere manifest.

From the moment it came into being it has dedicated its entire ability, its whole driving force, and all of its energies to the service of the manufacturing industries of Australia—advocating that they be given an adequate measure of protection; fighting against the dumping of overseas goods to the detriment of local products; championing local enterprise when such championing was necessary; impressing upon Governments the urgent need of taking every conceivable step to advance the development of manufacturing industries; recording by pen and picture the production feats of the factories and the engineering plants; keeping Australian manufacturers informed of the latest overseas research and investigation; acquainting them of important happenings in their own land; hammering home, in season and out of season, the absolute indispensability of applying Science to each and every phase of production.

THIS service has been rendered by "The Australasian Manufacturer," the orange-coloured weekly which finds its way into the factories and workshops, not only of the Commonwealth, but also of many lands overseas; on to the desks of executives in the wholesale and retail trades; in short, into the offices of buyers and sellers in this country and in the leading countries abroad.

The editorials are the journal's most powerful weapons. Indeed, throughout the fifty-two weeks of the year these constitute the fighting arms wherewith are waged battles against injustice to the manufacturing industries; against Government and civilian action calculated to threaten their interests and their rights; against the taking of steps which may imperil industrial freedom; against any organised effort to lower the prestige or retard the progress of the manufacturing industries, the industries on which, in the final analysis, are dependent national progress, national prosperity, and national security.

Dealing, for instance, with the dismissal by the Judicial Committee of the Privy Council of the then Federal Government's appeal against the ruling of the High Court of Australia, that Section 46 of the Banking Act of 1947 is invalid, we commented editorially:

"Australian manufacturers realise that a Government monopoly of banking, by whatever means it may be brought about, inevitably would prevent a free choice of banking service. The existing flexible financial facilities and competition for the meeting of widely differing financial needs would cease to exist. In their place would rise up a Colossus that would bestride the industrial and commercial worlds. Australians in general, and Australian manufacturers in particular, must insist, therefore, that the Federal Government shall not flinch from them one of the most fundamental of their freedoms—the freedom to conduct their financial affairs along such lines and with such institutions as they may choose, that they may be at liberty to utilise fully and without hindrance the splendid facilities placed at their disposal by the trading banks of their land."

Discussing the lamentable fact that Australia's annual production of steel is below capacity, "The Manufacturer" declared:

"It is a universally recognised fact that the output of the iron and steel works of a nation constitute a reliable index to its present industrial status and to its future manufacturing expansion and development. Taking that as an accurate yardstick of measurement, it is to be feared that Australia's position in this important regard leaves much to be desired. For, according to a recent statement by the chairman of directors of Broken Hill Pty. Co. Ltd., Mr. H. G. Darling, the total output of steel ingots by Australia's major plants during the past year was 1,143,057 tons, a mere 64.70 per cent. of their capacity. Main contributing factor to this reduced output was, of course, the continual shortage of coal, a shortage which throughout the year lowered the tempo of production at Newcastle, Port Kembla, and Whyalla, and which, because of the nation-wide coal strike, ultimately developed into a complete lack of coal, putting out the fires in the furnaces and bringing steel production to an absolute halt. . . . If the basic iron and steel industries could be assured adequate and continuous supplies of coal, plus a swelling of their labor force, the day should not be far distant when Australia's gigantic steel undertakings are producing each year the two million tons of steel products they are to-day capable of producing. In that day, not only will the stability and progress of the nation's basic industries be assured, but also the stability and progress of the nation's entire Industrial Machine."

In different vein, the journal acclaimed the launching within Australia of a £10,000,000 rayon industry, writing:—

"The recent decision of Courtaulds Ltd., England, to establish within the Commonwealth a £10,000,000 project for the manufacture of both viscose and acetate rayon yarn constitutes the most significant happening in Industrial Australia since the conclusion of World War II. The factory for the production of viscose yarn is to be established at Tomago, near Newcastle, New South Wales. At this writing, the location of the factory for the manufacture of acetate yarn has not yet been decided. In whatever locality it is established, however, it will mean prosperity and diversified employment."

The "Pithy Jottings" section, while dealing in the main with the more personal aspects of the industrial scene, also records details of such expansion plans as are announced at the annual meetings of companies; reports the initiation of new ventures—summarising the industrial situation in brevities.

Unquestionably, one of "The Manufacturer's" most highly valued services is the publication of descriptive articles of individual factories and engineering plants, articles which detail outstanding accomplishments and describe such techniques and equipment as possess unique characteristics. In this section, for example, was told the fascinating story of the foundation and progress of the industry established by that well-known and highly regarded industrial figure, the late John Heine, letterpress and illustrations recording the enterprise's achievements down the years.

Equally interesting and informative was the article outlining the activities of the Australian Forge and Engineering Co. Ltd., telling of its first beginnings, of its consistent growth; of the high quality of its products—many of which were illustrated.

And so on from industry to industry, from State to State—individual developments are detailed; highlights in production are recorded.

The measure of useful service rendered by the "Industrial Equipment News" may be gauged by the fact that during the year literally thousands of requests are received from industrialists desiring further particulars of the new devices and mechanisms illustrated and described in this section. These inquiries, by the way, are by no means confined to Australia, rather do they come also from many countries overseas.

Down the years, so many and varied have been the tasks performed by the Inquiry Page in the matter of supplying information concerning sources of supply of raw materials, of the semi-finished and the finished products of industry, of machines and machine tools, that it has aptly been termed the connecting link between those interested in the purchase and in the sale of every type of Australian made product.

The strictly business sections—Trade Marks and Patent Applications; Industrial Registrations; Tenders, Open and Accepted—are conducted with that efficiency that spells ready availability of information eagerly sought.

"The Manufacturer," in short, touches, and touches expertly, every facet of the industrial life of this nation. Every field is covered with a conciseness and a skill which bespeak the master hand. In all of this work it is supported ably by its two important subsidiaries, "The Annual" and "The Australian Manufacturers' Directory," the Blue Book of Australian Industry, the latter publication comprising classified lists of the products turned out in Australian factories and workshops, together with a list of the names and full addresses of their makers.

This Annual, appearing as it does at the half-turn of the century, records with pride the manufacturing achievements of this young nation, and looks forward, with eyes bright with hope, to the even greater achievements it knows the immediate years are destined to witness.



# Industrial Development IN VICTORIA.

## Planning to Win Independence in Fuel and Power Supplies

By the Premier of Victoria, the Hon. T. T. HOLLWAY.

**VICTORIA** stands on the threshold of huge industrial development. In effect it is weaving its way into a position from which it will move forward into the industrial world with great strength and immense resources.

UP to the present time Victoria has been sadly handicapped through lack of hard fuels. Because of this, its many secondary industries have been forced to live a hand to mouth existence. Each stoppage on the New South Wales coalfields has caused dislocation and loss.

With limited black coal seams of its own, Victoria has had to depend largely on imports from New South Wales. Over the last 20 years the uncertainty of adequate and continuous supplies from the sister State has been a nightmare to manufacturers.

During this period there has been no such thing as building up reserve stocks to guard against interruptions caused by industrial disputes in New South Wales and transport troubles due to lack of shipping and bad weather. It has been a case of making the best use of the coal available and trusting to Providence for a continuance of supplies.

### GROWS WORSE.

In more recent years the problem has been accentuated.

When shipping has been plentiful there have been times when no coal has been available to load the ships with. When there has been a plentiful output of coal there have been no ships to put it in.

So Victoria seemed to "get it in the neck" no matter what happened.

Undoubtedly, many large industrial concerns that would have started in this State if there had been any guarantee of continuity of coal supplies have sought locations in States where there were not the same risks.

It has been a case of self-preservation so far as these industries are concerned.

Coal has always been, and always will be, the lifeline of industrial development.

Victoria attempted over a quarter of a century ago to end to some extent its dependence on New South Wales coal. It set up the State Electricity Commission, which began to operate on the brown coal deposits of Victoria, generating electricity and manufacturing briquettes.

### NATURAL GROWTH TOO GREAT.

Since its inception, the Commission has performed a wonderful service to this State, but with the abnormal growth of industry, the Commission has been unable during the past few years to fully meet the demands made on its resources.

The result has been a steady deterioration of the industrial position, so far as potential expansion is concerned.

Hundreds of manufacturers, anxious to start operations here, because of the vast pool of raw materials available, have hesitated to do so owing to the uncertainty of the fuel and power position.

Although many manufacturers have added to the number of Victorian industries, they

have had to face up with other manufacturers to the fuel difficulties.

Certainly the present Government has helped to lighten their load as much as possible, by the importation of coal from overseas, and increased production of raw brown coal, but it cannot shut its eyes to the fact that the people of Victoria will know no peace of mind until the huge plans for developing our own brown coal and hydro-electric resources are in operation.

The Government is now going full steam ahead with development of a new open cut at Morwell and the construction of two additional briquetting factories there, as the first step to win independence in fuel supplies for Victoria.

### MILLIONS TO BE SPENT.

This will involve an expenditure of over £20 million, and add 1,300,000 tons of briquettes annually to our fuel pool. Work is now proceeding—night and day—on a removal of the overburden from the immense coal seam to be worked.

Modern machinery, obtained from many parts of the world, as well as in Australia, will help greatly to speed up the actual process of coal winning and the production of briquettes.

Altogether, four briquette factories are planned for Morwell, and concurrently the electricity generating plant at Yallourn is being greatly extended.

In addition to these vast undertakings, gas will be produced from brown coal, and piped nearly 100 miles to the metropolitan area.

This will be the first time anywhere in

the world that gasification of brown coal has taken place outside of Germany.

A Lurgi plant will be set up at Morwell, where briquettes will be the source of raw materials for the production of gas.

From Morwell to Melbourne there are a great number of towns that will be provided with gas supplies from the pipe line to serve the metropolis.

The Victorian Government has spent a considerable sum in scientific investigation of brown coal gasification, and its technical experts overseas and in Australia are confident that the scheme is practicable, and beyond the experimental stage.

The Metropolitan Gas Company, which has been co-operating with the Government in research on gasification, will undertake the initial work by installing a plant at its South Melbourne works, but the main plant will be located at the source of raw materials in the Latrobe Valley.

The production of gas from brown coal will, to a large extent, help to lift the siege on black coal that has been taking place for years, and assist materially to meet the expanding needs of manufacturers in the metropolis.

Gas has become a vital factor in industry, and a full and continuous supply will help on the Government's plans to make Victoria a highly industrialised State.

The gas companies in Melbourne have done a wonderful job in meeting the increasing difficulties that have been caused by the shipment of inferior quality coal from Newcastle.

But for the ingenuity displayed by the companies in rising above ever-increasing problems, Victoria would be in an extremely bad way to-day. It is to the credit of the gas companies that they have explored every avenue of science and technique to meet the position.

### PROVINCIAL CITIES MUST BENEFIT.

As the Morwell gasification plans develop, the Government will examine the possibilities of providing provincial cities with brown coal gas by pipe line from Melbourne.

If this is found to be economically unsound, the Government will assist the gas companies in the country to improve their black coal plants to keep pace with the needs of decentralised industries.

So whatever happens, country industries will be in a much better position than they were before the decision of the Government to produce gas as well as electricity from our own brown coal deposits.

Within the next few years I hope to see substantial headway made with the extension of electricity to rural centres in Victoria. This must help greatly the Government's campaign to decentralise secondary industries.

We have made substantial progress with the establishment of new secondary industries in the country, but there are many difficulties



The Hon. T. T. HOLLWAY, M.L.A.,  
Premier of Victoria.



The canteen at a linen thread factory at Warrigul, Vic.



Interior of a clothing factory at Ballarat, Vic.

that have to be overcome before Victoria can take full advantage of the great opportunities that offer for spreading its industries.

The three chief obstacles to rural expansion are:—

A housing problem which is not peculiar to Victoria, but which is gradually being eased.

Shortage of steel for the building of modern factories.

Adequate water supplies to meet the demand of industries calling for huge quantities of water.

I must deal with these difficulties separately. Let me take housing first. Since the Victorian Housing was requisitioned to help end the shortage caused by the lag of building during the war, a great number of the homes erected by it have been in the metropolis.

The present State Government, however, has instructed the Commission to devote more attention to country needs, especially in centres where secondary industries are established or are about to be started. At least half the homes now constructed by the Commission must be in the country.

As a result there has been a big improvement in the rural housing programme of late, and this will be accelerated as more materials become available.

I am hopeful that in the new year there will be a speeding up of steel production.

We are well on the way to overcoming the third difficulty—water supply in the country. New schemes are being put in, and water trusts assisted materially to strengthen existing water supplies.

#### GOOD RESULTS IN THE COUNTRY.

The policy of decentralising industries in Victoria is receiving the full backing of the people, and an encouraging response from manufacturers who wish to get out of the congested metropolitan area, where travel fatigue is being suffered by employees living long distances from their work.

Many old-established city firms who have established branches of their industry in country towns have found the departure well worth-while.

They report an absence of industrial trouble, healthier employees, less absenteeism, and a decided interest in their industry by townspeople. They are also freed of the competition for labour which exists in the metropolitan area, where there is a continual transfer of employees from one industry to another.

In the country employees live close to their work. They are of a contented nature, take a pride in their work, and are grateful for the fact that new industries are providing remunerative and constant employment, instead of the seasonal work which they previously had to engage in.

There are hundreds of thousands of country people who have no desire to work in the city. They prefer the healthy atmosphere of the country. Most of the drift of country population to the metropolis in the past has been due to the lack of steady employment in the country, and to a desire on the part of parents to give their children a good education.

Both these disabilities have been greatly

lessened in the past few years. There was a time when jobs were hard to get. The difficulty is now to fill all the jobs offering.

Great strides have also been made in country educational facilities. Higher education has been brought within the reach of all country scholars by free bus services provided by the Government. These services bring children to high schools and take them home again at night. Many parents prefer this system to sending their children to boarding schools or hostels. The Government is spending about £400,000 a year on this service.

The system operates also in regard to higher elementary and technical schools. Consolidated schools, of which there are now many in Victoria, are adding greatly to country educational facilities.

There is a gradually increasing flow of technical students to country industry, and these youths are making splendid progress in the work of manufacture.

#### OVERSEAS INDUSTRIES.

Victoria has had more than its fair share of the overseas industries that have been started in Australia. A special department of State development has been set up to give every assistance to firms seeking to try their fortune in this State.

Negotiations usually commence in Great Britain with the Agent-General, and reach finality with the expert staff employed solely to further secondary industry in Victoria.

On the staff is an industries location officer who saves the time and money of visiting overseas executive officers by showing them on quick tours the best possible locations for

(Continued on page 284)

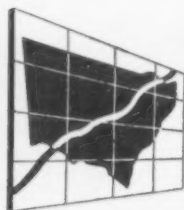


Returned sailors and soldiers have established this woollen mill in the country.



Meat works and wharf at Geelong, Vic.





# Industrial Development in NEW SOUTH WALES

By Hon. James McGirr, M.L.A., Premier of New South Wales.

**S**YDNEY, with a population now 1,600,000, has become the second largest metropolitan area, second only to London, in the British Commonwealth of Nations. It ranks also as one of the whole world's dozen largest centres of modern industry and commerce.

But Sydney does not stand alone. Only seventy-five miles to the north is Newcastle, with its great steelworks, chemical works, textile mills and many other industries. Only forty-five miles to the south is Wollongong, including Port Kembla, another important centre of iron and steel production, of chemical and other manufacturers. It is also an important fact that, within eighty miles north and west of Sydney, and within forty miles south, is mined more than 80 per cent. of all Australia's bituminous coal.

This 120 miles of glorious coastline and the country stretching back to the mountains is the most thickly populated and highly industrialised region in Australia. In its present industrial development, in its including the great bulk of the steel industry, in its possession of most of Australia's black coal, in its excellent ports for coastal and overseas shipping—and, in another aspect, as the largest and most concentrated market for manufactured goods—this zone, Newcastle-Sydney-Wollongong, stands supreme.

**F**OR the last nine years, the Government of New South Wales has been fostering a process of industrial decentralisation, the establishment of new factories in towns and country centres throughout the State.

During the war this movement was greatly assisted by the building, outside the Newcastle-Sydney-Wollongong zone, of a number of Commonwealth factories for munitions and defence supplies. Those factories have, since the war, been leased or sold to private enterprise, and have been adapted to the manufacture of civil needs. Whilst the greater portion of secondary activity outside the Newcastle-Sydney-Wollongong zone is related largely to the processing of the products of the soil, such as sawmills, flourmills, milk-processing, fruit and vegetable canning, etc., the use of the former defence establishments and the impetus given thereby to local industry, has resulted in an encouraging growth in manufacturing, particularly in the lighter industries, such as textiles, employing a predominance of females.

During the Government's term of office new factories have been established at some eighty country centres throughout the State, including the cities of Orange, Wagga, Albury, Bathurst, Goulburn and towns such as Forbes, Taree, Mudgee and Corowa, with products ranging from engineering and farm machinery, electrical cables and equipment, refrigerators, washing machines to textiles, shoes and tobacco.

At the same time, within the present highly industrialised zone, say, within a radius of seventy-five miles from Sydney Harbour Bridge, there has been considerable local decentralisation. In Sydney itself there has been an outward movement away from the old industrial districts to establish new industries towards and beyond Parramatta, at Liverpool and other points on the Western and Southern fringes of Greater Sydney, and at St. Marys, thirty miles to the West.

There has also been a rapid expansion of industries at Newcastle, while many important new factories have been opened in towns on and near the northern coalfields. This district is destined to develop industrially on a very large scale during the next ten years. The fact that it has been selected by Courtalds as the site for their huge new rayon factory is significant. It is safe to say that the expansion of some large existing industries, together with the establishment of new industries now in prospect, such as Courtalds, will mean an increase of at least 100,000 in Newcastle district's population during the next decade.

Wollongong, including Port Kembla, has doubled its industrial employment since 1939. But the biggest development at this southern end of the Newcastle-Sydney-Wollongong zone has yet to come. Within a very few years there will be completed the great new plants, the new iron and steel rolling mills, and the tinplate works which are now being constructed. Many other developments also are under way in the district; and there is little doubt that Wollongong's population, which has doubled in the last ten years, will double again in the next ten.

Recognising the need for increased port facilities to serve the northern and north-western portion of the State, the Government has just recently decided to make a commencement with the construction of a deep sea port at Iluka, at the mouth of the Clarence River. The necessary extensions of the road facilities serving this area will also be undertaken. The present annual value of the exportable produce of that portion of the State within the sphere of influence of this port is approximately £32,000,000, with resources now awaiting development which are capable of greatly increasing this production. The Government believes that with the develop-

ment of this port and the growth of its trade, avenues will be opened for expanding considerably industrial activity in this region of the State.

All this industrial development has been fostered—is still being fostered—in every possible way by the State Government. Recognising early that the chief restraint would be due to limited supplies of coal, limiting in turn both railway transport and the generation of electric power, the Government of the State joined forces with the Commonwealth in the establishment of the Joint Coal Board, a body entrusted, amongst other functions, with responsibility for increasing the production of coal. Considerable progress is already being made, partly through the development of open cuts as an addition to underground mining, and partly through the mechanisation of underground mines. However, as the rate of mechanisation is dependent upon the rate at which machines can be manufactured or imported and installed, the full results of the Coal Board's efforts will not be seen for another two or three years.

In addition to this, the Government itself, after sinking a number of trial shafts, is now preparing to work new underground State mines, together with several large open cuts which will substantially augment coal supplies for the railways and for the generation of electricity.

Synchronising with increases of coal production will be the installation of new electric generating plants to increase the State's total power supply by 50 per cent. during the next few years. Then, on the longer-range plan, the harnessing of hydro-electric power from the Snowy Mountains will again double the State's supply of electricity in another ten years.

The Government's policy of assisting industrial development takes many different forms in accordance with the circumstances of  
(Continued on page 277)



The Hon. JAMES MCGIRR, M.L.A.,  
Premier of New South Wales.





## Progressive W.A. Secondary Industries



By the Hon. Ross McLarty, Premier of Western Australia.

WEST AUSTRALIAN manufacturing industries continued to expand during 1949. Employment in factories is now approaching 40,000. Before World War II, the total was 23,000. Western Australia's increase over the past decade compares favourably with that of the more industrialised Eastern States. There are now in this State more persons employed in manufacturing than in its agricultural industries.

Perhaps the major development during the year was the official opening of the Chamberlain tractor works at Welshpool, which have a capacity of 2,000 tractors a year. The prospects of the establishment of a steel industry also brightened during the year.

THE Government of Western Australia is continuing its encouragement of the fishing and fish canning industries which have made such great strides since the war. In 1949 two Mersey-type trawlers were brought from Lancashire by a private syndicate, with Government assistance. Trawling operations in the Great Australian Bight, off Albany, have commenced.

Although it will take time to find which are the best trawling grounds in this region, the enterprise bears every promise of success, and is already augmenting the supplies of fish to a modern snap-freezing works in Albany. Western Australia now possesses six of Australia's nineteen fish canneries.

The fish canneries on the south coast during the twelve months ended June produced nearly two and a half million cans of fish. Most of this was salmon and herring. A trial run on sardines indicated that a worth-while industry can be developed on these also. The crayfish industry, which is of great importance to the State owing to its dollar earning capacity, expanded considerably during 1949.

A private whaling firm operating from the old Norwegian whaling station at Point Cloates, on the North-west coast, had a very successful first season, capturing just on 200 whales and disposing overseas 1,100 tons of oil valued at £90,000. The company anticipates that next year, with additional digestors in operation, about 400 whales will be treated. Also, the Commonwealth Government is in process of establishing a whaling station at Carnarvon, about 150 miles south of Point Cloates. This station is expected to treat about 600 whales a year, for a return of over £600,000 annually.

During the year negotiations between the Commonwealth and State Governments for the acquisition of the flax mills at Boyup Brook were successfully concluded. The local growers have formed a co-operative company, who have been given a lease, and who will keep the mill running. From this foundation there are prospects of establishing later a complete flax spinning and weaving industry in Western Australia.



The Hon. ROSS McLARTY,  
Premier of Western Australia.

The State Government purchased the former Commonwealth power alcohol distillery at Collie during the year. An option over the distillery has been taken by private interests who, using a tried American process, intend to export large quantities of converted wheat, a substitute for rice, to the Eastern Countries. The distillery may treat several million bushels of wheat annually. It is anticipated that a company to develop the project will be floated in the near future.

The special committee which the Government appointed to investigate the economics of gas production from Collie coal is of opinion, as a result of its inquiries, that a town gas of a satisfactory calorific value can be produced. However, owing to present overseas capital cost uncertainties, due to devaluation and urgent priorities for labour and materials, it is unlikely that a Lurgi project will be undertaken for some time.

In the meantime, Collie coal is being used for the manufacture of carburetted water gas by the Fremantle Gas Works, and its use for a similar purpose may be extended to the major metropolitan gas works at East Perth. A significant aspect of these developments is that Western Australia, through them may become independent of the uncertain supplies of coal from the Eastern States. Other recent experiments have indicated that Collie coal can also be used for steel production.

Several technicians from Brasserts Ltd., of New York, one of the world's best known steel consulting firms, who hold extensive leases from the State Government of the iron ore deposits at Koolan Island in Yampi Sound, recently visited Western Australia to conduct an investigation into the economics of an integrated iron and steel industry. Their report should be available in the near future.

Meanwhile it can be said now that the technical problems of steel production here are not insuperable; the success of any proposed venture will depend largely on costs and markets. There is every indication that the market position is favourable, and as the State possesses immense high-grade deposits of ore, the prospects are good for the establishment of a steel industry in Western Australia in the not distant future.

In common with the rest of the Commonwealth, the State's engineering industries were severely handicapped by a shortage of steel during 1949; supplies were approximately only about one-half of requirements. The position is gradually being eased through the Government's importations of steel supplies from overseas, thus making more of the cheaper Australian supplies available to private industry.

A number of new projects are listed to commence in Western Australia in the future. A large and very well-known jam and fruit processing firm in the Eastern States intends to open a factory here. Another Australia-wide organisation intends, in combination with some local engineering firms, to manufacture heavy equipment such as road-graders. The only portion of the equipment not made in Western Australia will be the power units. Further developments in the cement, building material, and wood distillation industries are also planned.

Secondary industry in Western Australia has not been stimulated of recent years by overseas capital and enterprise to the extent that some other States have been stimulated, but it is hoped that overseas investors and manufacturers will soon realise the opportunities which this growing State, with its huge and varied resources, offers.

The State Government has a Department of Industrial Development located in Barrack-street, Perth, and this department is equipped and ready to assist and advise any manufacturer interested in establishing business in Western Australia.



## QUEENSLAND'S INDUSTRIES PROGRESSING

By the Hon. E. M. HANLON, M.L.A., Premier of Queensland.

QUEENSLAND'S secondary industries continue to show a marked expansion, despite the handicap to production caused by shortages of raw materials.

The measure of industrial development in Queensland can be gauged from the fact that between September, 1945, and June, 1948, a total of £5,844,000 new capital has been invested or is proposed for investment in secondary industry in Queensland.

The number of businesses involved in this development is 117, of which 69 are new businesses and 47 are existing businesses which are expanding their activities. Eight of these businesses are connected with overseas interests and account for £2,290,000 of the total capital investment.

The greatest expansion has taken place in industries dealing with industrial metals, machines, conveyances, and involves 39 businesses with new capital of £2,799,500, but all classes of industry have contributed to the development.

Business activity generally is also at a record level. According to the Deputy Registrar of Companies, more Queensland enterprises with more capital were established in 1948 than in any other previous year. In 1948, 241 companies were formed with a total authorised capital of £7,468,000. Highest pre-war figures were 122 companies in 1939, representing authorised capital of £1,667,000.

IN 1947-48 there were 3,642 factories in the State, an increase of 275 over the previous year and 697 over the 1945-46 total. Average factory employment, including working proprietors, continued to expand, being 76,732 persons (63,506 males and 13,226 females), an increase of 5,133.

The net value of factory production after allowing for purchase of materials, including containers and cost of power, repairs and replacements, was £42,929,000, an increase of £7,592,000 (or 21 per cent.) over 1946-47. This amount included £24,163,000 for salaries and wages, made up of £21,659,000 for males and £2,504,000 for females. Average yearly payments were £357 for males and £191 for females. Average value of production per worker rose to £559, an increase of £65.

Of the total value of factory production of £42,929,000, more than one-half (£22,079,000) was produced in factories in the metropolitan area. The rest of South Queensland and North Queensland each produced about one-fifth of the total (£8,877,000 and £8,999,000 respectively), whilst Central Queensland produced 7 per cent. of the total (£2,975,000).

Steadily widening scope of Queensland manufactures is shown by the industries occupying the Rocklea munition works area, purchase of which from the Commonwealth was completed on June 30, 1949.

There are now 69 industries operating within the area, providing employment for over 1,300 persons. Queensland's first cotton spinning mill is located at Rocklea, as is the American Penn Elastic Co. Pty. Ltd., which is covering rubber thread with cotton and rayon yarn, then knitting it into corset fabric. The first extruded lead pipe and solder made here comes from another operator in the area.

To-day there are firms engaged in the manufacture of glass louvres and electric stoves; motor bodies; food containers; industrial chemicals and dairy cleansers; synthetic resins; paints; cheese processing; motor vehicle parts; concrete tiles; refrigerators; gaskets; extension ladders and trestles; canisters and food containers.



Hon. E. M. HANLON, M.L.A.,  
Queensland Premier.

Outside the main factory area at Rocklea, the Commonwealth Engineering Company Ltd. is establishing a branch works to produce railway rolling stock, and the English Electric Co. Ltd. is leasing the Government marine engine works to manufacture heavy electrical power plants. Commonwealth land in the vicinity is being sold to Evans Deakin and Co. Ltd., for the expansion of their ship-building and general engineering activities.

Other buildings at Mount Gravatt, Northgate and Redbank, in addition to buildings in Rockhampton, Townsville and Cairns, will become available to industry as they are released.

Conversion of Crown lands between Hamilton wharves and Pinkenba into one of the main industrial areas in Brisbane is planned by the Government.

The area will be divided into suitable industrial blocks, and roads and railways necessary for the economic operation of industries established. Additional docking facilities are also planned.

The land is available for lease to approved industries, generally for a period of 30 years, but if substantial capital improvement are carried out, a perpetual lease may be obtained.

Some industries already have begun operations there, and plans for further industries to establish themselves in the area are under negotiation.

Among the industries that are or will be operating on the Hamilton lands are oil distribution installations, motor body works, dye works, chemical works, mineral sand separation, vegetable preserving, canister manufacturing, and wood-working.

The former Commonwealth Army Vehicle Park at Mount Gravatt was recently re-zoned for industrial purposes. The area has a number of buildings which are easily convertible for industrial purposes. Already a number of companies have taken leases and are installing their plant in some of the buildings.

These include a handloom weaving plant from London, an engineering works, saw manufacturers, and a large aerated water factory.

A paper and board mill on the Pine River at Petrie, and a cement works at Stuart, near Townsville, are in the preliminary stages of erection.

Another oil company is investigating the possibility of obtaining a suitable site in Brisbane for the construction of a large installation for the storage and distribution of petrol. To conform with zoning plans, the oil installation will have to be confined to the lower reaches of the river. A tentative site has been selected, and investigations are now being made to ascertain whether wharfage, and railway facilities, can be provided. It is estimated that the ultimate cost of the installation will be about £700,000, and it will provide employment for 300 persons.

Other important new industries which have been or are being established in Queensland are two large textile factories, a clothing factory, fruit canning, brick and tile works, condensed milk and milk powder and cold storage and quick freezing in the Brisbane area.

Most important expansion of an existing industry is probably that of the cement works at Darra, which is increasing its capacity to 20,000 tons per annum.

At Toowoomba the manufacture of ribbons and bindings is being undertaken by an English firm, which expects to employ up to 300.

A firm manufacturing concrete tiles has begun the establishment of works at the centres throughout Queensland.

A brick works is being established near Cairns, which will

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# AUSTRALIA LOOKS AHEAD

By the Rt. Hon. R. G. Casey, Minister for National Development.

**E**XECUTION of a vast national development plan aimed at changing the whole economic pattern of this country within a generation is the over-riding objective with which Australia enters upon the second half of this crucial century.

Based on systematic, widespread exploitation of Australia's great natural resources, the plan calls for public and private investment on a scale never previously envisaged.

Our vision of Australia is a nation supporting double its present population within 30 years, producing an abundance of the necessities of modern civilisation and contributing its full share to the prosperity and progress of her Asian neighbours. This is not a prospect which we can afford to regard either as a luxury, a political plaything or merely as an artificial stimulant for temporary prosperity.

**F**OR Australia, national development on a scale very much greater than we have ever contemplated in the past is a necessity which will determine in the next 10 or 20 years our right to continue to occupy three million square miles of coveted territory in a troubled world.

The Commonwealth Government believes, therefore, that there is a pressing urgency attaching to its plans for rapid increases in population and production—two landmarks towards which every national effort and all our planning and thinking must be directed.

In the plans which the Government is working out, these two great aims of population and production are linked. We will raise Australia's population to 10 million people within this decade by encouraging migration at the rate of 200,000 a year, but we will not properly absorb these people, plus our own natural increase of 50,000 a year, unless we succeed in greatly speeding up development and production. At the same time, increased output of real wealth cannot take place unless we bring migrants from overseas to increase our labour force. In other words, immigration and development are closely related, each depending largely on the other.

In 1947 migration to Australia totalled 12,000 people. The following year it rose to 48,000, and in 1949 to almost 150,000. This year it will reach 200,000, including 100,000 people from the United Kingdom and elsewhere, 50,000 people from Europe, and 50,000 from other countries. Considering that most of these new settlers will travel 12,000 miles from the other side of the world, this will be one of the world's greatest population movements.

While in many ways these new settlers provide an answer to Australia's development problems in that they will swell the ranks of our inadequate labour force, they present, at the same time, a challenge to our productive resources which must be met if our economy and standards of living are to survive.

Australia to-day presents a picture of great undeveloped resources in a land racked by shortages of almost every basic commodity except food. Our production of coal, steel, building materials, and the things they provide is inadequate for even our present population.

In some of our industries, production is still geared to the easy-going days before the war. We need 18 million tons of coal a year now, and produce 14 million tons. By 1952 our annual need will be 21 million tons. This is a weakness which strikes at the very heart of our industrial structure. Because of it, our steel production is very far short of plant capacity.

In solving the coal and steel problems, production targets in all other industries will be brought within reach. For this reason, therefore, plans to develop all forms of coal mining—with emphasis on open cut methods—will be given the highest priority. We must cut ourselves free from the standards of the past and attack these production targets on a scale related to our future needs and not to the present limits of our population.

There is such confidence that we will beat the coal shortage that the steel industry is well advanced with plans to double its output within the next few years. This will be the largest industrial project embarked on in Australia to date—even greater than that of the construction of the initial steel plants.

By 1950 Australia will be producing three times more electric power than to-day—and this does not take account of the power to be eventually derived from the Snowy Mountains Hydro-electric Scheme, which in itself will produce as much power as is now generated in the whole of Australia.

Decentralisation of production and population will constantly be in the forefront of our programme. The use of the most modern industrial techniques, the encouragement of higher technological standards and a relentless searching after new and wider uses for our natural resources will be pursued.

As a background to these developments a great programme of public works far more extensive than ever undertaken at any period of our history will be under way. In water conservation, many projects are already either under construction or in the planning stages. Large scale generating of electric power from coal and water, land settlement schemes, development of North Australia, the expansion of manufacturing industry and the development of such special defence projects as the Rocket Range will need the concentration of all resources available both from inside and outside Australia.

We do not expect to achieve this programme on our own. The flow of large and valuable industries from abroad is increasing and will be encouraged. Increasing demand for goods of all types will require substantial new investment. To mention just one item, it is estimated that to overcome the back lag in railway rolling stock in



The Rt. Hon. R. G. CASEY.

five years, 900 locomotives and 16,000 waggons, costing £88 million, are needed.

The magnet of investment capital is opportunity, and Australia offers this in full measure. The Government is looking to private enterprise to provide a major share of the initiative required to carry out this vast programme. The Government believes that private enterprise, which built up by far the greater part of the productive resources of this and other lands, still has great vigour and purpose, and can play a major part in helping Australia to recapture the pioneering spirit that energised our earlier years.

One of the greatest necessities for Australia is the revival of incentive, and risk-taking. We must release the energy, imagination and creative force in those who have the capacity and the courage to take advantage of the opportunities offered in this young and potentially great country.



# TASMANIA

## An Industrial State



[By Robert Cosgrove, Premier of Tasmania.]

**TASMANIA** has demonstrated by its remarkable progress that it is admirably situated for the conduct of a wide range of manufactures.

The reasons for this are clear and fundamental.

Among them are the following:

Excellent factory sites, cheap hydro-electric power, convenient transport facilities to anywhere in the world, temperate climate, economical living, and a very co-operative people.

All parts of the State possess scenic beauty, and the healthy outdoor pastimes and sports which can be enjoyed make good, healthy living available to all, and the climatic conditions induce contentment and high production.

Products of Tasmanian Industries are well-established on the world's markets, and are common in every State in Australia and in the Dominion of New Zealand.

The Government of the State welcomes industrial organisations or individuals seeking to establish industries in Tasmania to serve either world, Australian or local markets, and will help them in a practical way.

ON 24th November, 1642, Abel Jansen Tasman, who had sailed from the Dutch East Indies in August of that year, discovered Tasmania, which he named Van Diemen's Land, after Anthony Van Diemen, who was then the Governor-General of the Dutch East Indies.

In 1798 George Bass, a Naval Surgeon, and Matthew Flinders sailed from Sydney to Westernport, Victoria, and established the fact that Tasmania was separated from the Mainland of Australia by what is now known as Bass Strait.

Colonisation of these Southern lands was not encouraged by the first discoverers, but international developments in 1803 caused the British to continue explorations of this great Southern continent and a settlement was formed in Tasmania at Risdon Cove, and in 1804 the Port Phillip Settlement from Victoria moved to Hobart. Van Diemen's Land at this time was under the jurisdiction of New South Wales, but in 1825 it was separated from the control of that State. In 1853 it was re-named Tasmania, after its discoverer.

Tasmania's early development was generally devoted to primary production. In view of the difficulties of transport and its comparative isolation, in the 19th century it had to depend to a large extent upon its own resources. While most of the work of the people consisted of farming and timber getting, a certain amount of secondary industry was, needless to say, essential.

The early settlers consisted of Army Officers and Government servants, professional men, skilled artisans of many kinds, and land workers, most of whom came from various parts of the British Isles. Being isolated, their progress was dependent upon their own efforts. Skilled tradesmen were in demand, and these not only retained their skill, but passed it to the younger generation, and most of these who entered the skilled trades became very accomplished and versatile workmen because they had no convenient source from which to obtain articles they could not make themselves. This

attribute of Tasmanian workers exists to the present day, and until recent years, Tasmanian workmen were so much in demand on the Australian Mainland that there was a regular drift of skilled artisans from this island to the Mainland States.

And so Tasmania continued to be a primary producing State. Among its well-known primary products are timber, some of which is unsurpassed in the world for ship-building and joinery; fruit, particularly apples and small fruits, which thrive in its temperate climate; hops—one of the earliest crops, probably due, and with every justification, to the countryman's love of ale—which does not seem to have diminished with the passing of the years—and wool. In the colony's early days a considerable amount of whaling was carried out in the Antarctic, and on the southern shores remains of old boiling-down stations are still to be found. The building of wooden ships which sailed every ocean in the world was carried out at many places, and Tasmanian shipbuilders still produce small wooden ships and yachts of outstanding quality. Some of the timbers used in them, especially Huon Pine, appears to be almost everlasting.

Owing to the difficulties which Australia experienced during the First World War, 1914-1918, in the matter of obtaining products of heavy and medium secondary industries, considerable industrial development took place after 1920. Secondary industries of many kinds were set up in the various States, and Tasmania, although the smallest and most isolated State, played her part in this advancement. The State's freedom from industrial disturbance, mainly due to the co-operative nature of its people, its then growing supply of hydro-electric power, its temperate climate and good living conditions, were large factors in this development.

The threat of, and later, outbreak of the Second World War, 1939-45, added to this secondary industry drive, and in the decade since 1938 the increase in Tasmania's secondary industry has been phenomenal. With the industrial development of Australia, Tasmania at first continued to lose its trained craftsmen to Mainland Industries, but the Government of the State in the last decade has brought to the notice of industrialists both here and on the Mainland and Overseas, the advantages possessed by the island.

Without going deeply into statistics, the following brief summary will give an indication of this advance, which is still progressing at an even greater rate, and from indications now, the increase during the next decade will outpass that of the last.

Population, 1938	234,853
.. 1948	262,364
August, 1949	280,000 (estimated)

The average increase per decade over the last 110 years has been approximately 19,000, but in the decade now ending the increase will exceed 40,000, and this increase is solely due to Tasmania's rapidly increasing secondary industries.

The number of persons in employment in 1939, excluding Defence Forces, Rural and Domestic, was 49,000, while in 1949 the same group totalled 74,920.

The value of imports in 1938-39 was £11,215,000, and exports were £12,233,000, indicating a total trade value of £23,448,000, while the 1948 figures were—imports £26,300,000, exports £26,850,000, making a total of over £53,000,000.



The Hon. R. COSGROVE, M.H.A.,  
Premier of Tasmania.





DEVELOPMENT OF INDUSTRY REQUIRES

CHEAP

HYDRO-ELECTRIC

POWER

# TASMANIA

OFFERS

THE GREATEST ADVANTAGES IN THE SOUTHERN HEMISPHERE

CHEAP POWER

DEEP WATER PORTS—TEMPERATE CLIMATE

ABUNDANT FRESH WATER

PARTICULARS FROM:

THE HYDRO-ELECTRIC COMMISSION • HOBART • TASMANIA  
OR THE AGENT-GENERAL FOR TASMANIA

The following figures covering manufacturing industries proper for the decade 1938-48 are also of interest, and indicate without any explanation the progress which has been made.

	Land and Buildings	Plant and Machinery	Output	Net Production	Salaries and Wages paid
1938	£3,717,102	£6,402,270	£11,158,205	£5,398,659	£2,479,886
1948	£6,271,365	£9,915,837	£28,784,564	£12,744,517	£6,865,337
			H.P. Used	No. of Factories	
1938			173,293	944	
1948			265,546	1,225	

## SHIPPING.

Being an island State, it is natural that development of ports would play a prominent part in Tasmania's economy. Hobart and Launceston have been major ports for many years, and in recent years Devonport and Burnie, on the North-west Coast, have also been developed, and these four ports, with their rapidly improving modern equipment, will be capable of handling a much larger amount of merchandise and other goods.

## INDUSTRIES.

A short resume of the largest industries which are established in the State will suffice to show the manner in which industrialists from the Australian Mainland and those from other parts of the world have appreciated the advantages the island has to offer.

### Engineering and Metallurgical, etc.

	Establishments	Value of Net Production	Employees
1938	23	£1,245,000	2,270
1948	61	£2,885,000	3,200
		Sawmills, Joinery, etc.	
1938	309	£528,778	2,170
1948	421	£1,332,463	3,200
		Woollen, Tweed, Knitting, etc.	
1938	6	£416,609	1,585
1948	9	£1,168,314	2,650

In addition to the many industries long established in Tasmania, the following are cited as the more important of those recently established or at present being established, but to these could be added a number of smaller units which will all help to play a major part in the State's future industrial economy, as will be understood by all conversant with industrial development.

Austral Bronze Company Pty. Ltd. (Bronze Sheet, Strip and Alloy).

Australian Newsprint Mills, Boyer (Newsprint).

Australian Associated Pulp and Paper Mills, Burnie (Fine Papers).

Australian Titan Products Pty. Ltd., Burnie (Paint and Paint Pigments).

T. M. Brodribb Pty. Ltd. (Light Engineering and Metal Blend Materials).

Broadhurst Tootal Lee, from Manchester, England (Cotton Goods).

D. M. Camm & Sons (Fruit Processing).

Dewcrisp Steam Vegetable Processing Co., Scottsdale (Food Processing).

Dowell Industrial (Tas.) Pty. Ltd. (Structural Steel Engineers).

Freeman and Lester, Devonport (General Engineers).

Hume Pipe and Steel (Steel and Concrete Pipes and Constructions).

International Cannery Pty. Ltd. (Fruit and Fish Processing).

James Nelson Ltd., from Nelson, England (Rayon Goods).

K.L. Tractors Ltd. (Tractors, Caterpillar, etc.).

Launceston Silica Brick Pty. Ltd. (Lime Silica Bricks).

Modern Transport and Metal Industries (General Engineers, Structural Steel, Motor Bodies).

Oerlikon Manufacturing Ltd. (Welding Rods).

Repco Bearing Co. (Automobile Engine Bearing and Precision Equipment).

Southern Isle Canning Co., Hagley (Food Processing).

Sterling Paint and Varnish (Paint and Varnishes).

Silk & Textile Printers (Silk and Textile Finishing and Printing).

Sutex Ltd. (Spinners and Worsted Weavers).

Titan Nail and Wire (Nails, Chisels, Augers).

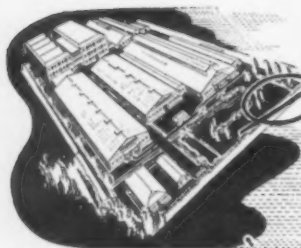
Tasmanian Board Mills, Launceston (Prefabricated Boards, Building Boards, etc.).

Thomas Owen and Co. (Straw Boards).

Tip Top Paints Pty. Ltd. (Paint and Varnish).

William Adams & Co. (Earth Moving Machinery, Tractors, etc.).

A. Wander Ltd. (Ovaltine), Burnie (Milk Processing).



# South Australia's BRIGHT INDUSTRIAL FUTURE

By K. T. HARDY, President of the South Australian Chamber of Manufactures.

**SOUTH AUSTRALIA** is the fastest growing State. My predecessors have referred to the industrial revolution which has occurred in the central State during the last fifteen years, but, since they wrote, the expansion has continued.

Though it has been, and still may be, necessary to change the form of some secondary production to meet the demand of a buyers' market, expansion continues with the accession of more labour through immigration.

Latest official figures show that in the decade which closed last June, South Australian factory employment increased by 75 per cent., compared with a general increase throughout Australia of 55 per cent. This State heads the percentage expansion in all States, and its increase in total employment in all industries (47 per cent.) is second among the States.

This progress is not all due to the stimulus given to manufacture during the war. Marked development began in 1935 when hands employed had increased by 10,000 from the depth of the depression to 33,497.

Since then progress has been phenomenal and continuous, until the total at June last was 73,346, while employment in primary production had, unfortunately, shown a slight decrease.

**N**EW industries played a big part in the expansion of manufacture in South Australia, but extension of existing factories and the conversion to civil use of the vast potential created by the establishment of munition industries was the chief factor in the State's industrial progress.

Mechanisation has played at least as big a part as manpower in the expansion of secondary industry, for since 1935 horsepower in factories has more than doubled and the efficiency of machines has increased even more than that.

We are developing manual skill, and I whole-heartedly support a remark made by the Premier (Mr. Playford) recently that South Australia has a people second to none, and workmen superior to anything in the Commonwealth. Mr. Playford has himself given a magnificent lead to the people of the State by inducing large overseas manufacturers to establish branches here, and by giving encouragement to industry through progressive legislation and far-seeing administration.

South Australians have long enjoyed a reputation for progressiveness and moderation. Notably, we have an enviable record in respect to industrial relations. In this State during the ten years 1938-39 to 1948-49 man days lost per head of population averaged .039, second only to Tasmania, with .025. Other States ranged up to .275.

The Government of the late C. C. Kingston introduced the principle of compulsory arbitration in industrial disputes in South Australia in 1894, and since then South Australians have readily accepted the adjudication of legally constituted tribunals in the settlement of their claims. From South Australia compulsory arbitra-

tion spread to other States, and was adopted by the Commonwealth after Federation.

South Australian workers generally recognise the merits of the system and comparatively few strikes have originated in this State.

A sense of civic responsibility is widespread among workers here. The community spirit thus engendered was never better exemplified than during the coal strike last year when all the people made sacrifices so that the maximum amount of power might be available to industry, which, except where auxiliary power plants were available, turned over to night work.

The result was that, though for over a month South Australia received no Newcastle coal, unemployment was so low as to be almost negligible.

The maintenance and spread of this spirit would do more than any other single factor to give permanence to the prosperity which Australia has enjoyed while overtaking wartime shortages and through high overseas prices for her primary products.

We hope, in a few years, with the aid of the power plant now being built at Port Augusta burning only Leigh Creek coal, to be almost independent of Newcastle coal if last winter's strike should be repeated.

We still feel our lack of raw materials, for though a blast furnace was installed at Whyalla during the war and we have almost unlimited iron ore, black coal is still King of smelting. But South Australia has ceased to be the Cinderella State, mainly through her own efforts.

It has been remarked that the S.A. Chamber of Manufactures is the yardstick of South Australian progress. The Chamber has kept pace with the development of industry. In the year just closed it recorded two notable achievements—it attained 80 years and a membership exceeding 2,000.

In this there are several significant features. Last year its membership increased by 10 per cent. In other words, one-tenth of its members were enrolled in one-eightieth part of its life. Three-quarters of its members joined during the last decade.

So striking has the Chamber's progress been in the last forty years that its total income at the beginning of these four decades would not pay for the postage stamps it uses to-day.

At the end of 1949 the membership totalled 2,050, and we expect this increase to continue. The staff is being enlarged to meet the demands made by the increasing membership, and considerably more of the Chamber's own building is being taken over to meet the need for extra accommodation.

We now look forward to rapidly expanding development of the State, and with it of the Chamber, which is attracting to its ranks small as well as large undertakings.

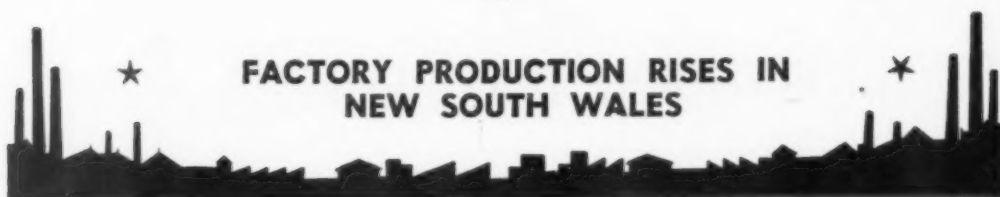
This article is being written almost immediately upon my assumption of office, so, apart from a determination to support the traditions and policy so ably laid down by the Chamber over a course of years, it is too soon to predict our activities in the years ahead.

We have, however, a rapidly growing population, and the Chamber will strive, as in the past, to develop industry, primary as well as secondary, to meet the needs of the greater State that we visualise.

(Continued on page 119)



Mr. K. T. HARDY,  
President of the South Australian  
Chamber of Manufactures.



## FACTORY PRODUCTION RISES IN NEW SOUTH WALES

(By R. J. Webster, President, N.S.W. Chamber of Manufactures.)

**MANUFACTURING** developments in N.S.W. continue at an eminently satisfactory tempo. Throughout 1948-49, for instance, vast expansion characterised virtually every field, important new undertakings being inaugurated and large-scale extensions being made to a number of those already functioning.

A particularly interesting aspect of the manufacturing situation was the steady stream of capital from abroad which flowed into New South Wales, capital which is being dispersed over wide areas of the State, speeding the conversion of its rich natural resources into the everyday requirements of the people, erecting up-to-date factories and engineering plants which, in ever-increasing measure, provide the remunerative jobs which, in the final analysis, are the most effective magnets for attracting to these shores the skilled craftsmen and trained technicians from lands overseas.

The consistent nature of the progress is evident from the fact that at June 30th, 1949, New South Wales factories numbered 16,087, by comparison with 15,194 in 1947-48. This meant during the past year the rise of factory employment to 382,020, compared with 366,850 in the previous year; the salaries and wages bills being £146,535,642 and £125,345,878 respectively.

As is inevitably the case in the Mother State, the metal industries hold pride of place. This becomes increasingly evident when it is pointed out that in the ten-year period, 1938-39 to 1948-49, their net value of production rose from £31,691,000 to £101,617,000. Among other departments of production recording important advances during the same period may be mentioned paints, chemicals, oils, and soaps from £6,393,000 to £17,605,000; clothing from £6,227,000 to £21,732,000; paper, stationery, and printing from £6,538,000 to £15,812,000; with textiles at £3,553,000 and £12,832,000 registering a more than three-fold advance.

Unquestionably, the most important single development in the last-mentioned field was the decision of Courtaulds Ltd., the world-renowned British textile organisation, to establish at Tomago, near Newcastle, a £7,000,000 industry for the production of both viscose and acetate rayon yarn. The mighty project is sponsored by Courtaulds Ltd. and a number of prominent Australian industrial and financial interests, including the Colonial Sugar Refining Co. Ltd. and the Australian Mutual Provident Society.

A matter of grave concern to the State, however, is the fact that in 1948-49 its steel output was only 65 per cent. of capacity, a condition of affairs particularly lamentable in view of the urgent demand of almost every section of the nation's manufacturing industries for steel, more steel, and yet more steel. The following table, compiled by Research Service, records the rises and falls in output during the period 1936-1949:—

### AUSTRALIAN STEEL PRODUCTION.

	Tons		Tons
1936	820,000	1943	1,626,000
1937	1,074,000	1944	1,524,000
1938	1,159,000	1945	1,346,000
1939	1,169,000	1946	1,055,000
1940	1,287,000	1947	1,312,000
1941	1,645,000	1948	1,343,000
1942	1,697,000	1949	1,129,000

The tragedy is that millions of pounds' worth of steel-producing plant is forced into idleness at both Newcastle and Port Kembla. The responsibility for this rests on the shoulders of the coal miners of New South Wales. For shortage of coal has been chiefly responsible for the serious decline in steel production, which marked recent years, particularly 1948-49. This is revealed by the fact that iron and steel works in New South Wales in 1947 consumed 43,800 tons of coal a week; in 1948, 38,900 tons, and in 1949, 34,900 tons. The decline in coal consumption inevitably meant a decline in the steel output.

Despite the temporary setback, the men behind Australia's great iron and steel undertakings look to the future with confidence. For, at the moment they are in the process of implementing a huge seven-year programme of expansion and development, including the construction of two new coke oven batteries; coal washing plant; blast furnace; open heart furnace extensions; a hot and cold strip mill; plus the nationally significant tinplate plant.

Basic cause of the serious decline in steel production, as of the serious declines in many other sections of Australian manufacturing industry was, of course, the general strike of the coal miners of Australia. Lasting for seven weeks, the upheaval brought to a virtual halt the nation's Industrial Machine; threw hundreds of thousands of workers out of their jobs; inflicted grievous hardship on every section of the Australian community; and reduced the wealth of the nation by some £140,000,000. Individual manufacturing companies suffered severely not only during the period of the closure of their

plants, but for several months subsequently, due to the fact that employees on second and third shifts drifted into employment elsewhere. New companies which have not been operating long enough to build up reserves will show the most serious effects, particularly in those cases where their operations are confined to this State. On all counts it was a truly national calamity, the one subsequent bright spot of the happening being that the concluding weeks of 1949 saw Australia reach an all-time record in the production of coal.

The deeply entrenched strength and the resiliency of the State's manufacturing activities are proved by the fact that, despite a major industrial disturbance of this character, its factories continued to



Mr. R. J. WEBSTER,

grow in numbers its factory workers to increase; and the value of its factory production to do likewise. This is shown by pre-war, during-the-war, and post-war (1948-49) manufacturing statistics of New South Wales. In 1938-39, for instance, 9,464 factories were in operation, employing 231,800 workers, with the net value of production at £90,266,000. The position during the last year of the war (1944-45) was 11,359 factories; 317,187 employees, and net production value, £159,875,000; while by 1948-49, progress in every field spelt the rising of the figures to 16,087 factories; 382,000 employees; and £251,199,000 net value of production.

Two happenings of the year are destined to play a vital part in furthering the industrialisation of New South Wales. The first was the determination of the Governments of the Commonwealth of New South Wales, and of Victoria, to implement immediately the Snowy River hydro-electric project, at an estimated cost of £166,000,000. This ranks as the most colossal project ever undertaken in Australia, aiming, first, to make available to secondary industries vast amounts of additional power; second, to provide water for the rich Murray Valley and adjoining pastures, as well as electric power for many of the Commonwealth's most important rural areas; and third, to strengthen the defence position.

The second happening was the opening of the New South Wales University of Technology at Kensington, near Sydney, which event was described by the State's Minister for Education, the Hon.

(Continued on page 277)





## FOUNDRIY DEVELOPMENTS IN AUSTRALIA



By K. H. Spencer, A.S.T.C., B.Ec., A.A.C.I., L.I.M. (Eng.), of Metters Ltd., and Councillor, N.S.W. Branch Institute of Australian Foundrymen.

THE foundry industry in Australia has changed—and changed greatly—in the last ten years. It seems safe to predict that the changes in the next ten years will be greater still.

Foundries all over the continent are using methods and doing jobs that in 1940 would have seemed the product of a particularly vivid imagination. Casting is still casting—metal is melted and formed while molten—but the way that you do it, rather than what you do, is now so very much altered.

Sand treatment and control is commonplace; new methods of mould forming would leave an old-time moulder gasping at the speed and precision of the job; metal is melted in electric furnaces that bring laboratory accuracy to the foundry floor; castings are cleaned by the high pressure water jets, "untouched by human hand." Foundries are becoming, and in very many cases have become, clean and quiet.

THE aim of the foundry to-day is, of course, to melt more metal and produce better castings more cheaply. Allied with this aim is the fact that the craftsman moulder is a dying race. Better products are required from labour that is becoming more and more unskilled: this is why foundry techniques are becoming so much more standardised as unit operations.

### THE MOST IMPORTANT DEVELOPMENT.

The most important development within the walls of the foundry, however, will not be found in the catalogues of the suppliers of foundry equipment or in improved alloys. It is the attitude of the men who run the plant: the foremen and managers of large and small foundries.

Before the war, "standardisation" was a word very rarely heard: a "specification" was too comical to merit serious consideration, except, of course, in such works as automotive and aircraft factories. During the war, the various Ministries and Departments placed on the foundries the (at first) almost unbearable weight of stringent inspection for physical, chemical, radiographic and even magnetic properties on alloys most foundrymen didn't even know existed. This specifying was in many cases unnecessary; in many cases it drove foundrymen into frenzies of rage; but in the end, castings were produced. The castings of unbelievable quality had been made.

After the war, there was a perfectly natural reaction away from excessively high standards, but most foundrymen and companies manufacturing castings found that had a war-time legacy. The old standards weren't good enough. Deoxidising fluxing, temperature and sand control were retained in scores of small shops, because they built a better doorknob. Antagonism to minimum standards of acceptance has, in the main, passed, and foundrymen are striving to improve their quality to please themselves, their own harshest critics.

It is specially significant that this attitude of mind exists under present conditions, with the chronic difficulties of maintaining production under the load of material, power and labour shortages. Perhaps the reason is in the pride of accomplishment that persists to such a marked degree in the craft of melting and forming metal, making each new job a different problem of approach.

### HOW FAR WE HAVE GONE.

This has made more important an addition to the field of trade associations. Since its foundation in 1943, the Institute of Australian Foundrymen has been a popular and valuable means of exchange for views and information on foundry technique. At the meetings of this Commonwealth-wide body, men with a keen and constant interest in their craft learn to know each other and share their knowledge. This alone is a very important development indeed.

From the point of view of physical production, I will try to summarise briefly some of the more important changes.

Materials handling has received much attention in the foundry industry, as in other fields. In general, developments have been American in origin. Mechanical charging of

cupola furnaces, for instance, is well developed and well received, although subject to some antagonism before it was proven fully satisfactory. The use of skip loading and drop-bottom or cone-bottom buckets on cupolas is spreading in iron foundries of all sizes. This and the magnetic handling of pig iron and scrap has been shown economically sound, as well as a means of eliminating a great deal of the heavy manual labour previously so common in the industry. Monorail handling of molten metal in covered and insulated ladles has enabled speedy delivery to be made of hot metal, with the removal of many of the hazards of this particularly touchy task. Gravity conveyors for moulds allows permanent moulding and casting stations. Sand treatment plants are increasing in number, and before long it should be quite common



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to see conveyor belt delivery of sand to moulding stations, and belt or apron conveyors for the removal of castings.

Melting technique in both non-ferrous and ferrous fields has progressed rapidly. Patent types of high efficiency furnaces are making foundries far more cost-conscious. Probably the most important steps here are the increased use of the B.C.I.R.A. balanced blast cupola for cast-iron melting, and the manufacture of electric furnaces in Australia for all types of metal-melting. These latter would undoubtedly be far more widely used if sufficient power were available, as relatively low cost high frequency, low frequency and direct arc furnaces are now made in the Commonwealth in price ranges and with

power consumptions that render them attractive on operating cost alone, quite apart from the advantages of clean and controlled melting.

Moulding in sand with modern, high-capacity machines has allowed greatly increased throughputs of heavier castings. The new patterns or "sandsinger" and rollover type equipment handle large volumes of work with ease, turning out reproducibly high quality with relatively unskilled labour. Core blowing has progressed enormously in a very short time, and has virtually eliminated other methods of preparing smaller cores. These types of plant, again, are now manufactured in Australia at a price that is more than competitive with overseas equipment.

The constitution of the workers in foundry industry has been modified greatly in the period under review. The war-time "diluted" policy led to a high level of lesser-skilled employees, and the foundry industry is seriously short of new young members to be trained in all phases of foundry work. Whether this shortage can be overcome remains to be seen. A rapid extension has occurred, however, in the employment by foundries of professional metallurgical and chemical staff to work with the foundryman. Although such men have been an integral part of the industry in other countries for many years, the wide use of metallurgical and chemical control in secondary metallurgy in Australia was boosted mainly during the war period. This function would seem to be here to stay.

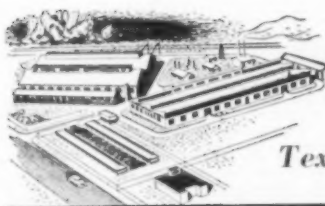
### WHERE WE ARE GOING.

The developments we can expect to see in the near future are those for which the industry is now prepared, and in which it shows great interest. In particular, the intensive developmental efforts by research institutions are of vital interest to the foundry trade. For instance, the recently publicised "nodular" cast irons are exercising the imagination of all. These would seem to be the long-sought-for missing link, to bring the foundry back into the engineering field and resolve to some extent the castings vs. forgings controversy — that hardy perennial wherever foundrymen meet non-foundrymen. This, in conjunction with techniques for permanent and semi-permanent moulding, should cut costs considerably by saving on die costs and machining time. Some of the new alloys, especially in the super-heat-resisting grades, used in modern power machinery are not amenable to forming except by casting, and may well lead to the establishment of investment moulding in this country.

As new foundries are built (and they are being built), it is reasonable to expect they will be laid out with more foresight than was usual in the past, and will be as modern in materials handling as possible. At the same time, as electric power for industrial purposes becomes more freely available, the wide use of electric melting should come about.

When these new things come to pass, and if they are given publicity, more new high-grade trainees will perhaps be attracted to the foundries, which will be (as many are now) clean, safe and congenial places in which to work.





## Present Position of Our Textile, Dyeing, Printing & Finishing Industries

THIS review, from which only extracts are published in this article, is one of the series prepared for general information by the Division of Industrial Development in the Department of Post-War Reconstruction.

The review briefly examines the general demand and supply situation in the industry, the principal factors of production such as labour, material and equipment, and other relevant matters. It does not purport to be a detailed and comprehensive study of the industry. It has been based on the statistics and other data, not being of a confidential character, which are available in this and other Government Departments, and also, on the results of discussions by the Division's officers with various persons associated with the industry.

The Division of Industrial Development will be pleased on application to discuss, and where possible to amplify, any matters relating to the industry under review. Such applications may be made to the Director, Division of Industrial Development, Wentworth House, 203 Collins Street, Melbourne, or to the Deputy Director, Division of Industrial Development, Phillip House, 119 Phillip Street, Sydney.

AS textile finishing is inseparably associated with cloth production it is one of Australia's oldest secondary industries. The first woollen mill was established at Parramatta in 1801, and a separate dyeing and finishing section was built at Botany in 1816. The woollen and worsted field has continued to be the most important part of the Australian textile industry, but there are now well established cotton and rayon industries meeting part of domestic requirements.

The first screen prints were made here in 1931, but the cruder process of stencilling had been carried out since 1915. Large-scale screen printing development dates from 1940 when the import of grey silk (natural or artificial) for screen printing was first granted duty-free entry under tariff By-law. Roller printing was commenced in 1939.

This review deals with the processes fabrics undergo after leaving the loom or knitting machine in order to make them serviceable and to improve their appearance. These processes include preparatory operations such as piece scouring, bleaching, dyeing, printing, and finishing processes such as tentering to width and pressing. The review also covers similar treatments given to fibres or yarn before spinning, weaving or knitting, but excludes wool scouring. Although finishing processes have an important effect on the feel and appearance of textiles, they are here discussed as ancillary to dyeing and printing, and do not receive particular consideration.

The processes of dyeing and finishing may be carried out by two classes of organisation: commission operators who take in unfinished textiles and finish them for their clients, and multiple process textile mills which dye and finish their own products. The bulk of the Australian output of textiles is dyed and finished by self-contained textile mills which own the cloth being processed. Commission dyers, however, may be regarded as constituting a separate industry, and their position is especially discussed in this Review.

Textile printing is usually done in specialist establishments, although some of these are controlled by firms principally engaged on weaving. Many of these firms also undertake commission dyeing and finishing.

The demand for dyeing and printing is contained in the demand for textiles. In practice this means apparel (including linings) and furnishings as these are the chief uses of dyed and printed material. The market situation in respect of the chief textiles is given below:—

**Wool.** The average consumption of woollen and worsted piece goods for the two years before the war approximated to 32.5 million square yards per annum, but the demand increased greatly during the war largely due to the Services' requirements. The estimation of the present demand is complicated by the shortages of some piece goods and by current price changes, due to the removal of subsidies, but it is probably near 35 million square yards per annum. Similarly, the demand for other wool materials is not stable, but approximates to 1.4 million blankets, 6 million pounds of fingering yarn, and 9.5 million pounds of yarn for machine knitting per annum. The demand for yarn by knitting mills is especially subject to fluctuation with changes in the supply position and relative prices of different fibres. The sharp increase in the price of wool textiles since the removal of subsidies has stimulated the demand for products made from mixed yarns containing wool.

Nearly all wool textiles are dyed. The Australian demand is predominantly for dyed blankets, and almost all knitwear is dyed either as yarn or after knitting.

Exports of wool piece goods approximately balance imports; thus the demand for local dyeing services for wool piece goods for apparel is given by the Australian demand for the materials, that is about 35 million square yards per annum. This figure would, of course, increase with the development of export markets, or if the population is materially expanded by the current immigration policy.

There is a limited demand for printed felts for slippers and floor coverings, and of printed wool textiles for apparel. The demand for printed wool dress materials would probably increase if there was adequate supply of fine textiles suitable for this production; at present relatively few retail purchasers are aware of the possibilities in this direction.

**Cotton.** It is difficult to assess the annual requirements of woven cotton textiles, but the demand for coloured piece goods for apparel approximates to 100 million square yards, over half of which is printed. As most cotton fabrics are in the utility range where price is an important factor, nearly all are roller printed. Besides the consumption of woven cotton apparel, nearly 10 million pounds of cotton yarn are used by the knitting industry. There is considerable demand for dyed yarn for trimmings, braid, sewing thread, etc., and most towels used in Australia are coloured.

Over 80 per cent. of the estimated Australian demand for woven cotton textiles is imported from overseas, as domestic manufacturers have not found the fine spinning and weaving field economically attractive. Australian production is largely in the field of sheeting, canvas and duck, which is bleached, but not dyed, and over 95 per cent. of coloured piece goods for apparel comes from abroad, nearly all in the finished condition. Hence there is a relatively small demand for dyeing and printing of cotton textiles, although there is a large demand for those textiles.

During the war and early post-war period, dyed and printed cotton dress material was difficult to obtain, but material could be imported in the grey. This assisted the development of commission dyeing and printing industries processing large quantities of material imported in the grey.

The recent trend has been towards the import of finished piece goods, with a consequent fall in the demand for the dyeing and printing of cotton textiles. The present position is fluid, but it is estimated that the Australian demand for commission dyeing of woven cotton piece goods is at the rate of approximately 8 million square yards per annum. The Australian cotton printing industry is also in a state of flux, but it is probable that the annual demand for local printing is at present between 1 and 2 million yards per annum, including "seersucker" type material.

If present trends continue, there will be an increasing tendency to revert to the old position of almost exclusive import of finished piece goods, although there is always the possibility, of course, of import of cheap cotton textiles in the grey from the East.

**Rayon.** The estimated annual Australian demand for woven rayon textiles is 50 million square yards, of which approximately half is printed. As much rayon material is in the fashion field, where cost is less important than attractiveness of design, there is at present considerable demand for hand printed fabric. In addition to woven rayon, 6 million pounds of yarn is used by knitters, most of which would be plain dyed.

The bulk of the woven rayon piece goods used in Australia is imported from overseas, but there is an established rayon weaving industry with an output at the rate of approximately 8.5 million square yards per annum, with a consequent demand for dyeing and some printing. There is also a demand for printing services for knitted material and for imported woven rayon piece goods together not exceeding 4 million square yards.

Known plans for expansion in the rayon weaving industry, if brought to fruition, would make possible an output of well above 40 million square yards per annum on a two shift basis. Such an output would cause a corresponding demand for dyeing and printing. However, the weaving industry is at present meeting severe competition from United Kingdom suppliers, and from Continental countries where labour costs are low and where sales are often largely dictated by the need to obtain currencies.

The Tariff Board has recently heard an application from the rayon weaving and printing industries for increased protection, but the Board has not yet announced its recommendation. The prospective local output of woven rayon piece goods, and the demand for dyeing and printing services will depend to a large extent on the ability of the local industry to meet overseas competition.

### SUPPLY.

At present the bulk of Australian dyeing is provided for wool textiles and is done in the woollen and worsted mills, but most printing is on rayon and cotton, and is done mainly by specialist firms. The woollen and worsted dyeing capacity of the commission dyeing industry is rather pressed, although there is surplus dyeing capacity in the self-contained mills. In the printing industry, capacity is much in excess of the present local call for printing services. The dyeing sections of mills are not operating at capacity because labour shortage curtails the output of wool textiles, while in the case of local printers the demand for their services has been greatly reduced by keen overseas competition from finished textiles.

**Dyeing.** The Australian output of woven woollen and worsted piece goods of approximately 35 million square yards is dyed locally, but at present no significant amount is printed.

Most wool products may be dyed at any one of a number of stages. Thus coloured woollen goods may be produced by dyeing loose wool prior to carding, or by dyeing the woven woollen piece goods, and it is estimated that 70 per cent. is dyed in the wool and 30 per cent. in the piece. Worsteds may be dyed in top, yarn or piece state. With current shortages of labour and worsted material, there has been a reduction in the variety of cloths made and an increase in the proportion of piece goods dyeing. Probably 40 per cent. of current worsted cloth production is dyed in top form, and the remaining 60 per cent. is piece dyed. Yarn dyeing is confined almost en-



tirely to the knitting and fingering yarn field. Loose wool or top dyeing enables a variety of woven patterns to be produced, while piece dyeing permits only one shade unless rayon or cotton is woven into the piece.

There is considerable production of shrink resisting wool knitwear, baby flannel, and fingering yarn. Although there is some application of moth proof and water resisting finishes to materials for normal wear, the demand for these processes is relatively small. It is possible that the demand would be stimulated if the public were more fully aware of possibilities in these fields.

As labour shortages prevent most large woollen and worsted mills from working at full capacity, few of their dyeing departments are fully taxed; however, mills still dye 70 per cent. of Australian production. During the past fifteen years, the proportion of the total output of wool textiles processed by commission operators has increased from 5 per cent. to nearly 30 per cent. of Australia's output. It is estimated that commission workers now handle about 11 million square yards of woollen and worsted material each year. This output is considerably in excess of the single shift capacity of the commission houses, and is obtained by operating key machines on an overtime or two shift basis.

Several established firms plan to expand their activities to cover woollen and worsted dyeing and finishing. The additional capacity of the industry that will result from the completion of these plants and from the expansion of firms already in this field should relieve the pressure on commission dyehouses.

Commission dyers in Australia handle approximately 8 million square yards of cotton piece goods per annum, but the capacity of the industry (on a one shift basis) is at least double this. The large excess of capacity over output is due to the decline in demand from the wartime peak when grey calico was imported for dyeing here. It is understandable that under these circumstances there are no major proposals to expand cotton dyeing capacity.

Most rayon weavers, commission dyehouses and large printing firms have equipment for rayon dyeing and finishing, and will undertake commission work. The appeal of rayon piece goods is due in a large measure to the finishing processes, and expensive equipment is essential for a full range of finishes. Hence there is a trend for rayon finishing to be carried out by specialist firms, the largest of which are controlled by rayon weavers. Rayon dyeing capacity is at present greatly in excess of demand, and there are plans in train for further extensions in this field. These extensions are chiefly in anticipation of a planned expansion in the local weaving of rayon textiles and, with existing capacity, should meet such requirements.

**Printing.** Standard textile printing equipment can be used for either cotton or rayon textiles; therefore, the capacity of the industry must be considered as a whole and not in terms of individual textiles.

As yet no printing is done by weaving mills, although some separate printing establishments are closely associated with rayon weavers.

The current rate of output of roller printed material is probably between 1 and 2 million yards per annum. Although some rayon has been roller printed, nearly all roller printing has been on cotton, and printers will handle this material in preference to rayon until their labour becomes skilled.

At present there are 8 roller printing machines in Australia, but not all have been put into operation. These machines vary from 1 to 10 colours, and take cloth from 36 to 54 inches in width. This gives a present capacity, installed or immediately ready for installation, of at least 5 million linear yards per annum on a one-shift basis.

Output has been much below capacity partly due to the necessity for training operators, but the keen competition from imported prints has also curtailed roller printing.

Known plans for expansion will approximately double capacity, and will give Australia a roller printing capacity far in excess of current requirements. This surplus capacity could become fully occupied if it became profitable to import cotton piece goods in the grey for finishing here, or if there was development of the Australian fine weaving industry. Printing capacity is an essential complement of fine weaving as with some materials a proportion of sub-standard production can be restored to a marketable condition by printing.

As regards screen printing, although speciality work was done before the war, production in terms of yardage was small. Wartime shortage of imported materials, the presence in this country of European migrants with screen printing experience, and the Tariff Board recommendation that woven silk in the grey for screen printing should be allowed entry under By-law, led to the establishment of a screen printing industry on a large scale. The difficulties of establishing, under wartime conditions, a new industry calling for skilled operators, resulted in the production by some firms of prints of quality inferior to that of imported textiles. With greater experience, quality has improved until many Australian prints rank at least equal to that of overseas production.

At present there is a screen printing output of about 4 million yards per annum, most of which is on woven or knitted rayon piece goods. There is a small output of screen prints on cotton, linen, and fine wool fabrics. Output has fallen considerably during the past 18 months, due to competition from imported prints, and if present trends continue, the industry will shrink further until only exclusive and speciality work is done.

The industry at present has capacity (on a one shift basis) for printing 6 million yards of material in a 4 colour pattern; in practice this yardage could vary according to the number of colours employed. With little further outlay and by the provision of relatively simple equipment, such as tables, capacity could be almost doubled in a very short time. Some firms are still expanding capacity in accordance with plans made in the early post-war period when, in the absence of adequate supplies of imported prints, it was profitable to import material in the grey for printing here. Rayon weavers, or their associated firms, are also planning the establishment or extension of their printing capacity as part of their general plans for expansion of the rayon weaving industry. This sug-

gests that prospective capacity will be greatly in excess of present demand.

For economic production, printing necessitates a minimum run for any one pattern. On the other hand, there is a limit to the yardage of one design that can be absorbed in any market before the pattern becomes too frequently encountered in apparel. Apart from the protection of the Australian industry against any overseas dumping, and to compensate for higher local production costs, the possibility of local printing on an economic scale depends on the ability of the Australian market to absorb a yardage of one particular pattern at least equal to the minimum economic throughput of standard printing equipment.

The estimated Australian market for printed outerwear in one design is:—

Exclusive fabrics	up to 1,000 square yards
Fashion goods	5,000 to 6,000 " "
Low-priced field	20,000 to 25,000 " "

For underwear fabrics, much longer runs would be possible.

In screen printing, except for speciality fabrics, the minimum economic output is 2,000 yards. Different colour combinations can be used within this minimum yardage, although it is uneconomical to change colours for less than 600 yards of material. With high priced exclusive materials, much shorter runs are possible.

For roller printing rayon fashion goods of high to medium price, a run of at least 1,200 yards per roller is necessary for multi-colour designs. This requires a minimum output of 6,000 yards for a 5 colour pattern where 5 rollers are used, while for a 3 colour print the minimum is, of course, 3,600 yards. However, once the printing machine has been set up, colours may be fairly readily altered without changing the set-up of rollers, and multi-colour designs can then be economically produced in runs of 1,000 yards or more for any one colour combination. For the low priced field, which includes most cotton piece goods, much longer runs are desirable to achieve minimum cost, for example, 20,000 to 25,000 yards of one pattern with a 4 or 5 colour print.

On this basis the Australian market seems able to absorb single patterns in all price ranges in a yardage corresponding to the minimum economic throughput for roller printing machines. However, the biggest demand is for cheap prints, where price is an important factor and overseas printers normally have continuous runs much in excess of the economic minimum and achieve very low unit cost. Despite the fact that overseas printers operate on very long runs, Australian manufacturers would not be seriously disadvantaged by their level of operations alone, provided they could achieve runs not less than those mentioned above.

The possibility of the successful operation, under normal market conditions, of a full scale roller printing industry could be increased by lowering the cost of roller engraving. Two methods of reducing the initial outlay on rollers have been considered by Australian firms. One involves the formation of a joint engraving establishment by several printing firms, thereby obviating the necessity for each printer installing engraving equipment. An alternative, which may involve difficulties of timing and transport, is for an association between Australian and overseas printing companies whereby rollers engraved and first used abroad would be shipped to Australia for further use here.

#### SUMMARY OF DEMAND AND SUPPLY.

The annual Australian demand for dyed woven woollen and worsted piece goods for apparel is approximately 35 million square yards. There is in addition a demand for about 1.4 million blankets, nearly 10 million pounds of yarn for knitting mills, and 6 million pounds of fingering yarn. These demands mostly involve dyeing, which is carried out in Australia.

Although the demand for woven cotton textiles is large, most are imported in the finished condition, and there is relatively little local dyeing or printing. Commission dyers receive about 8 million square yards of woven cotton piece goods, and roller printers handle between 1 and 2 million yards. In both cases installed capacity exceeds current demand.

The Australian consumption of woven rayon piece goods is near 50 million square yards, about 8.5 million of which are locally woven and dyed. Rayon textiles (including knitwear) form the basis of the screen printing industry, which has an output of about 4 million yards per annum largely from material imported in the grey. Australian production of rayon knitwear approximates to 6 million pounds, the bulk being dyed or screen printed locally.

#### LABOUR.

The Commonwealth Statistician does not publish separate employment statistics for the dyeing, printing and finishing sections in the textile industry, and it is difficult to arrive at a reliable estimate of the employment level from trade sources, as the finishing processes are closely connected with the weaving of fabrics and the mills have not recorded the employees separately. Also the commission dyeing of fabrics is difficult to separate from garment dyeing. However, in June, 1949, the Commonwealth Employment Service estimated the employment in the dyeing and finishing departments of textile mills at 2,200 (89 per cent. in New South Wales and Victoria), and the number employed on dyeing, printing and finishing undertaken by commission operators at 1,350 (91 per cent. in New South Wales and Victoria), of which about 600 are employed by printers. About 40 per cent. of all employees in the industry are females and about 7 per cent. juveniles.

About 28 per cent. of the men and 33 per cent. of the women employed in the industry may be regarded as skilled. Skilled occupations for men include roller machine printing, textile and fabric printing (hand painting) and leading hands employed on dye or bleaching machines; and for females, examination of finished cloth. There is no apprenticeship in the industry and the necessary skill is acquired for the most part on the job, but supplementary instruction is available at technical colleges. The Sydney Technical College has a three years' part-time course in the dyeing of textile fabrics and intends to establish a textile school in the near future, which will include courses in textile printing and dyeing. The Melbourne Technical College has a part-time course on practical dyeing for leading

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# ELECTRONICS IN INDUSTRY

By Mr. G. Mak, Electronics Engineer, Philips Electrical Industries of Australia Pty. Ltd., Hendon, South Australia

SOME people are under the impression that Electronics is a "cure-all" for manufacturing problems, no doubt as a result of the optimistic articles on the subject appearing in overseas publications. Others have quite a different opinion and regard Electronics as just one of those "new-fangled" ideas.

There is nothing alarming in this. History tells us that the same has happened over and over again. Think of the introduction of anaesthetics or the steam engine, to mention only two examples.

EVERY new idea or method has through the ages found both enthusiastic support and bitter opposition at first, but in the long run the extremes disappear to make way for a commonsense approach. When it appears that the new idea or method has beneficial values it usually does not take long before it is universally accepted.

Take, for instance, the case of anaesthetics. Nobody to-day would dream of undergoing an operation without an anaesthetic. We have become so used to the modern methods that we would feel lost without them.

The same will happen with "Electronics." At the moment there are still the two camps of support and opposition. True, Electronics is making headway, but very slowly in spite of the large sums of money spent in development during the second world war. Let us examine a few reasons why progress is slow.

First and foremost is the lack of understanding of what Electronics can and cannot do for the manufacturer. Often the engineer responsible for the production is not aware of the possibilities of electronics. He may have heard of it, but is under the impression that electronics cannot give him better production at lower cost. He may be right, but he may also be wrong, and only an electronic expert will be able to advise in this matter.

Secondly, there is in some cases a definite reluctance to put in a new type of equipment. Some people hold the view, "What was good enough for our fathers is good enough for us," and they stick to the more old-fashioned methods.

It may be that in this case some expert advice could bring improvement.

A third reason is the fact that in certain cases electronic equipment has not given the promised results. This may have been due to insufficient knowledge in the persons responsible for the installation of the equipment, maintenance, etc.

It should be borne in mind that not in all cases can electronic equipment give better results than existing equipment.

If some articles on electronics are to be believed, then if it is "Electronic" it must be good. Nothing is farther from the truth. Electronic equipment and methods can be superior, even far superior to mechanical equipment and existing methods, but they should be used intelligently.



Mr. G. MAK,  
Electronics Engineer, Philips Electrical Industries.

Yet another reason for the comparatively slow progress of electronics is the fact that until very recently there were no training courses at the Universities, Technical Colleges, etc., in this subject.

Those engaged on the design, installation, maintenance and application of electronic equipment are usually recruited from other branches of engineering, and are doing a good job; but there are not enough of them. In many new designs of production equipment the possibility of the use of electronics is not considered because there is no electronic expert to advise.

No doubt, in time, the obstacles now in the way of a more rapid introduction of electronics will disappear and the time will come when electronic equipment is just as common in factories as electric light is now.

Let us now consider where electronics could be of use in production. To do this we can divide industrial electronics into two main groups.

They are: (a) Power.

(b) Electronic intellect.

## POWER.

Electronics has not produced a primary source of power so far, only converters of energy or means for the control of energy.

We may divide this main group further as follows:

1. Gas discharge lamps. (Usually electric lamps are not considered to be a part of electronics, but a few applications as for instance stroboscopes, belong to it.)
2. High frequency heating.
3. Rectification.
4. Switching, e.g., by means of thyratrons and ignitrons.
5. Ultrasonics for material testing, sterilisation, etc.
6. X-Rays.
7. Alternating current generators.

## ELECTRONIC INTELLECT.

This part of electronics replaces, up to a certain point, the human intellect. While, of course, the electronic intellect is very limited in so far as no electronic equipment is capable of thinking as human beings can, it can, nevertheless, observe certain things. The main advantage of electronic intellect is the rapidity with which it can operate. For instance, the counting of thousands of impulses per second can easily be handled by an electronic counter. Another advantage is that human faults and fatigue are eliminated. Electronic intellect may be divided into four main groups. We have:

1. Electronic observation.

For electronic observation, use is made of electronic senses such as photo-electric cells, microphones, vibration pick-ups, thermocouples, etc.

The most primitive consequence to a stimulus is an alarm which may be in the form of a sound or light signal. The decision as to what to do then may be left to human beings, or this may also be left to electronic equipment and then we have both observation and action.

Accurate observation is measuring. Measuring may be done for the measuring result itself or for an action following it. This action is then called control.

The second main group is:

2. Memory Apparatus.

These apparatus are capable of storing a large amount of information which at any given moment may be extracted. The principle media are magnetic tape and wire, film and special electronic circuits.

3. Bookkeeping machines.

In this case the information is fed into the machine by means of punched cards and further operations, as adding, subtracting, etc., are done by the machine.

4. Calculating machines.

Also in this case the information is fed into the machine in one way or another and the machine does the operations. The difference with the bookkeeping machines is that the operations are much more involved.

The first group of electronic intellect, namely electronic observations, is the important one from the industrial applications point of view. Together with the power application of electronics a very large part of the manufacturing process can be covered.

It is not the intention to give a complete list of all the applications of electronics because such a list would be endlessly long, and, perhaps an important point may be overlooked.

In the following only the specific advantages will be discussed of the main group, power, and the sub-group, electronic observation. The first point is gas discharge lamps.

One of the industrial applications of gas discharge lamps is the stroboscope. The duration of the light flashes in a stroboscope lamp is only of the order of ten microseconds and the light intensity may be very high (a light flux of 20 million lumens is possible). Depending on the auxiliary apparatus, the stroboscope may be used as a single flash apparatus for photographic purposes. The flash may be initiated by electronic intellect. For instance, a sudden sound, vibration, etc., may be used as a stimulus (photographing of a breaking glass, hitting of a tennis ball or golf ball). Also there may be a great number of flashes per second which may be either adjusted by hand or controlled by means of external sound, light impulses or a contactor.

With stroboscopic flash gear it is possible to observe circular and vibratory motions (spinning wheels, shaft, vibrating machine parts, etc.) When a high light intensity stroboscope is used, it is possible to observe these phenomena in full daylight.

Other applications of gas discharge lamps may be found in those cases where large amounts of ultra violet radiations are required.





High frequency heating is the next point.

There are two basic types of high frequency heating apparatus. The first one is the induction type used for metals and other conducting substances. The second is the dielectric type used for non-conductors.

In the induction type of high frequency "oven" currents are induced in the material to be heated. Due to skin effect only the outside of the material is heated, although conduction will then carry the heat to the inside. However, due to the speed with which the heating takes place, the whole process may be finished before the interior has had time to heat up to any extent.

The main advantage of induction heating is high speed and controlled localised heating.

The dielectric type of high frequency heating is used for non-conductors and here the heating is not only on the outside but right through. One could say that high frequency heating gives results which are directly opposite to any other form of heating. With the conventional oven it is not possible to heat metal only on the outside and insulating materials quickly right through, but that is just what high frequency heating does.

#### Rectification.

In many cases direct current is an absolute necessity; for instance, charging of batteries, electro-plating, D.C. motors, arc lamps for film projection, voltage supply for transmitter tubes, etc. This direct current can be obtained by the rectification of alternating current. For this rectification, use may be made of high-vacuum or gas-filled rectifiers depending on the requirements. The rectifiers may be controlled by means of a control electrode, as for instance in the thyratrons, ignitrons and senditrons. By means of the control electrode the rectified output may be regulated.

There is a rectifier for practically any application; small high voltage rectifiers, power rectifiers, rectifiers for low voltages but high currents, etc.

One interesting application of high d.c. voltage should be mentioned here, and that is electrostatic precipitation.

Dust precipitation is more or less well known, but the use of electrostatic precipitation in the manufacture of emery paper, floor-mats, carpets, and imitation velour is not so well-known.

For instance, in the manufacture of imitation velour, short fibres are sprayed on a felt or other base material in an electrostatic field, the base material prior to spraying having been covered with glue. Under the influence of the electrostatic field the fibres stand on end perpendicular to the plane of the base material.

By this method about ten times the number of fibres can be sprayed on to the base material than would be possible without the electrostatic field.

The same principle is used in the manufacture of sandpaper.

When grid controlled rectifiers are used the D.C. output voltage can be controlled. This is an important aspect in the speed control of D.C. motors. Together with an "electronic intellect" the speed of operations of many industrial machines can be automatically controlled to suit the particular articles to be manufactured. It has been found that due to flexibility provided by such a set-up, production in many cases has been increased by 30 per cent. or more. In other cases it may be desirable to keep the speed as constant as possible. Electronic motor control is able to do that.

Switching is the following point to be discussed.

In many applications it is of vital importance that alternating current is switched on and off at absolutely precise moments; for instance, in spotwelding. Due to inertia, contactors are not suitable for this task. In these cases thyratrons or ignitrons are used. The energy required to control a thyatron is small, and consequently this tube is suitable for operation according to a predetermined plan or programme which is stored in a memory machine.

Where large currents have to be switched, ignitrons may be used, but these are then controlled by a thyatron.

Another application of electronic switching is in the circuit of inductive impedances such as solenoids. When ordinary switches are used, the switching off produces arcing and burnt contacts are usually the result. With thyratrons this difficulty can be overcome.

The advantages of electronic switching are absence of noise, accurate control, no moving parts, no arcing.

Ultrasonics is sound with a frequency above the audible range, i.e., above about 16,000 cycles per second. It is possible to produce ultrasonics by mechanical means, but the frequency is limited. With electronic oscillators with crystal radiators, frequencies of 200,000 cycles per second are easily obtained. The use of ultrasonics has not been investigated thoroughly. A few applications are the detection of cracks and flaws in metal, preparation of emulsion, coagulation, de-gassing of liquids, and sterilisation.

It is hardly necessary to point out the advantages of X-Rays. X-Rays are now extensively used for material inspection, faults in castings, welds, etc. The advantages are, of course, that X-Rays provide a non-destructive method of testing.

Alternating current generators. Electronic alternating current generators can be realised in two ways, namely:

- (a) High-vacuum tubes.
- (b) Gasfilled tubes.

When high vacuum tubes are used, very high frequencies can be generated, but the power is limited to some hundreds of kilowatts. An industrial application is in high frequency heating. For lower frequencies up to 1,000 cycles per second gasfilled tubes may be used, and the circuit arrangement for this type of alternating current generator is referred to as an inverter. Inverters are capable of generating thousands of kilowatts of alternating current. In both cases the primary source of power is direct current.

Inverter circuits are sometimes used in electronic motor control units to reclaim the kinetic energy in the moving parts of the Motor and the machine driven by the motor. If the machine is to be stopped or slowed down the motor acts as a generator feeding the

inverter. This in turn converts the d.c. output of the motor into alternating current of the same frequency as the Mains and "pumps" the energy back into the Mains. This is useful in cases where large amounts of energy are stored in the moving parts and where there is frequent stopping and starting.

As already mentioned, electronic intellect may, under certain circumstances, replace the human intellect.

The observations and the following actions must be of a very simple nature. Human beings are capable of observing and acting in cases many times more intricate than the most involved electronic equipment is capable of handling. Even animals are in that respect superior to man-made "brains."

Electronic intellect scores where the observation and following action are simple ones and where from an economic point of view it is cheaper than a human operator. It scores also where the phenomenon to be observed cannot be observed by humans because human beings have not the senses to detect it, where the change in magnitude is so small that the human senses do not react on it, or in those circumstances where human observation is impossible due to high temperatures, dangerous radiation, inaccessible places, etc.

A further point where electronics score is where high speed operation is necessary. Due to reaction time the action follows the observations by something around 200 milli seconds in human beings. It is known that the reaction time in animals may be much smaller, but there is practically no time lag in electronic equipment. Even purely mechanical equipment is many times slower than electronic equipment.

The choice whether electronic equipment should be used is, therefore, governed by the following points:—

- (a) In all cases where neither human beings or any mechanical, chemical, or other equipment can be used.
- (b) Where the speed of operation in any other form of control is too slow.
- (c) Where any other form of control is more expensive.

These points in themselves are logical, but it is surprising to see that in many industries costly manpower is used to a great extent in cases where the simplest of electronic control would do the job better and many times cheaper. Usually these cases are found in repetition work. During each operation the operator has to turn his attention to some part of the work that could have been done electronically, for instance, a final check on dimensions, feeding raw material into the machine, small readjustments to the machine, opening and closing of guards, etc. By using electronic methods, production can usually be increased, which means savings in wages, floorspace, depreciation on machines, etc.

Another important advantage of electronic intellect is the case with which the observed phenomenon (displacement, temperature, speed, etc.) can be manipulated. This is due to the fact that all phenomena are first transformed into electric currents. Then, with the application of known circuit techniques, amplification, attenuation, addition, subtraction, integration, differentiations, transmission, transformation can easily be done. Further, the information may be stored or delayed for some time.

This is a decided advantage over all other methods as combinations of the above manipulations can be done in the same electronic unit and consequently practically any desired characteristic or function can be obtained.

The pick-up devices at the disposal of the electronic engineer are many. There are in principle two classes of pick-ups. In the first class we find the devices which will generate electric currents, in the second class we have the devices which modify electric currents generated in another part of the circuit.

Electro dynamic microphones, thermocouples, gramophone pick-ups for instance belong to the first class. In the second class are carbon microphones, photo-electric tubes, temperature dependent resistance, etc.

Sometimes the phenomena to be observed are first transformed mechanically into other phenomena. It may happen that temperature has to be observed. Temperature can be transformed into a displacement by means of a bimetallic strip and this displacement can be measured electronically and the temperature is then observed indirectly.

Pressure can also be measured in the same way by transforming it into a displacement.

In similar ways phenomena, for which there are no direct electronic pick-ups, can still be observed and measured.

As mentioned earlier, the electronic intellect may simply be used to give an alarm in the form of a light or sound signal. This is the most simple form and in that case the action which should follow on the alarm is left to an operator. Usually, however, the action is also left to an electronic device or a purely electric apparatus as, for instance, a contactor. With combinations of electronic intellect and electronic power devices, as rectifying and switching devices, many of the industrial control problems can be solved, in particular those problems of keeping quantities such as speed, temperature, distance, tension, etc., constant.

Already many different types of electronic control units are on the market as standard equipment, but they cover only a comparatively small portion of the industry. To cover all industrial control problems thousands of different units would have to be made, which is practically impossible. Realising this difficulty, the electronic section of Philips Lamp Works, Eindhoven, is now developing and manufacturing fundamental units from which any desired control unit may be built.

#### ACKNOWLEDGMENT.

I am indebted to Mr. A. van SLUYTERS, Chief Engineer of the electronics section of Messrs. N. V. PHILIPS LAMP-WORKS, EINDHOVEN, HOLLAND, for the subject sub-divisions of electronics and part of the text which was taken from his book, "Electronics in Industry," published by N. V. UITGEVERSMY, DILIGENTIA, AMSTERDAM, HOLLAND.





# WARTIME FACTORIES WITH A PEACETIME FUTURE

**D**EVELOPMENT of manufacturing industry has been one of the most striking features of post-war Australia.

Industry has expanded in size, in range of production, in technical skill. But it has also extended its geographic boundaries. Decentralisation of manufacture has become a positive movement and a significant factor influencing the welfare of the whole nation. Important secondary industries usually concentrated in the large cities have been established, not only in the smaller State capitals, but also in many country towns.

During, but especially since, the war we have had a practical demonstration of something that previously had been mainly talked about. This has resulted from wise planning during the war when, in order to make use of available manpower and womanpower, factories had to be erected not only in established industrial areas, but in many places that previously knew little or nothing of manufacture.

Since the war there have been two strong influences helping to stimulate this development of Australian industry. First was the Commonwealth Government's policy that wherever possible factory buildings built for war purposes would be made available to private industry for peacetime manufacturing activities. Second was the absence in the metropolitan areas of Sydney and Melbourne of sufficient factory space to accommodate the unusually high degree of industrial expansion which the war brought in its wake.

Thus a combination of necessity and convenience gave the impetus to this post-war development. Almost under protest, manufacturers moved their plants into former munitions factories in what seemed to them to be distant towns. But since then experience has made these manufacturers decentralisation's most active supporters.

That there are many social advantages in removing factories from congested cities requires no argument. That decentralised manufacture is a sound economic and business proposition is being proved to-day by the number of firms successfully operating in country towns.

As early as 1943 the Commonwealth Government decided that decentralisation of industry would be an important part of its post-war policy. The various State Governments also committed themselves to encourage the decentralisation of industry, and a joint Commonwealth-State agreement on the responsibilities of each in this regard was adopted.

It is with the achievements of the Commonwealth in the discharge of its agreed-upon responsibilities to encourage decentralisation of industry that this article, which was prepared by the Commonwealth Division of Industrial Development, is concerned. It tells the story of war-time munitions factories which have become a strong force in the development and decentralisation of Australia's expanding industrial economy.

Not the whole of the story can be told. Many of its aspects rich in human endeavour, courage and enterprise must remain unstated until the history of those firms who pioneered large-scale commercial production at inland centres is told.

The article sets out to chronicle no more than the outline of what has happened since the war, profoundly influencing our future industrial development. The outline is etched only deeply enough to show its general trend and direction, to show its sources, and broadly to indicate its probable results.—John J. Dedman, Former Minister for Post-War Reconstruction.

**H**AD it not been that the war required Australia to make a great range of munitions, it might have been many years before our peacetime industry could have reached its present stage of decentralised development. In normal times such radical experiments as building a textile factory with half a million square feet of floor space in a dairying district 126 miles from Sydney would have been considered too risky to contemplate.

But under the pressure of war the building of a great network of defence factories became an urgent necessity. For example, Australia needed large ammunition and explosives factories, which had to be isolated from centres of congested population, yet reasonably close to shipping ports. In every State these wartime factories have become peacetime community manufacturing centres.

An extensive chain of subsidiary defence factories was rushed into production during the war to make such things as shell cases, fuses, ammunition and small arms components. These were strategically located through Australia—many of them in country areas. All this great network of wartime factories is to-day the spearhead of industrial decentralisation.

From a total of five in 1939, major Commonwealth-owned munitions factories had increased to 47 at the height of the munitions programme; 36 of these were established away from the metropolitan industrial areas.

Here are some details of the munitions factories constructed in the various States:

	Factory Area (Acres)	Authorised Expenditure	No. of Buildings
New South Wales	6,972	£12,276,280	1,402
Victoria	4,266	£6,509,400	1,160
Queensland	455	£1,192,400	163
South Australia	5,397	£7,578,380	1,499
Western Australia	140	£348,600	69
Tasmania	33	£410,300	31
	17,263 acres	£28,315,360	4,324

In addition, 220 production annexes were built as extensions to existing private factories. Then there were aircraft production establishments, food dehydration factories, grain alcohol distilleries, flax mills, and a great number of storage buildings which have since been used for private manufacture.

From Cairns to Hobart, and from Sydney to Perth, wartime buildings, ranging from relatively small single structures to huge concentrations of up to 900 buildings totalling more than 1,000,000

square feet of floor space on one site, are housing valuable peacetime industrial enterprises. However, the largest of such concentrations at Salisbury, near Adelaide, which comprises more than 1,000 buildings in a factory area covering 3,770 acres, has not been made available to industry. It is the headquarters of an important defence task, the Long-range Weapon Project.

By far the largest amount of new factory construction occurred in New South Wales, principally because that State was able to provide a greater supply of factory workers. Nevertheless, there was big expansion in Victoria, though development in South Australia was probably the most spectacular. In the other States the munitions factory building programme was largely confined to the outskirts of the metropolitan district.

Each of the six State capitals had at least one very large establishment just beyond its outer fringe. Near Sydney there were explosives factories at St. Mary's and Villawood; Melbourne had the great Maribyrnong Munitions Factories, which had long been in existence, and which were greatly added to during the war; near Brisbane the Rocklea Factory produced ammunition; Hendon, Finsbury and Salisbury factories were near Adelaide; ammunition came from the Welshpool plant outside Perth; and cartridge cases from the Derwent Park Factory near Hobart.

In 1943, with the war still at its height, the Commonwealth Government began consideration of what was to be done with its war factory assets when peace returned. In addition to defence requirements, due regard had to be given to what was the best possible use of the factory space involved, and also to the need to maintain and expand the greatly increased manufacturing strength built up during the war.

It was clear that heavy post-war demands by private industry for new factory space would clash with the need for a vigorous housing programme. Therefore, if industry were to expand immediately following the war, large blocks of factory space readily available for occupation were a necessity. At the same time, the existence of a number of war factories in widely decentralised locations provided an excellent opportunity to launch on a practical basis the Government's plans for encouraging the development of manufacturing industries away from the main capital cities.

Of great significance to industrial development in Australia was the Government's decision to retain only a few establishments for defence purposes, and to release the majority of factories either for sale or lease to private industry for peacetime commercial manufacturing projects.

The Secondary Industries Commission, set up in 1943 to plan



for the orderly transition of Australia's manufacturing from war to peace, became the authority responsible for finding peacetime uses for the surplus factories which had been constructed for munitions and other purposes. The Secondary Industries Commission was specially fitted for this task, as it was under the chairmanship of Mr. J. K. Jensen, who, as Secretary, Department of Munitions, had been largely responsible for the planning of the munitions factory construction programme.

Industry was quick to appreciate the advantages of occupying a former war factory. Following the many advances made during the war, industrialists were anxious to expand existing enterprises, and to begin new types of production as soon as hostilities ceased and men began to return to normal employment.

At the same time many important manufacturing concerns from other countries—principally Britain and America—were investigating prospects for the establishment of manufacturing activities in Australia.

With nearly 10,000,000 square feet of factory space available in former war plants to counter the shortage of other construction, Australia's post-war industrial expansion got away to a flying start. The change-over of wartime factories to peacetime production had commenced even before hostilities ceased.

By the end of July, 1946, less than a year after the end of fighting, some 120 individual enterprises had either bought or leased space in former war factories. Of these, 64 were in New South Wales, 20 in South Australia, 20 in Queensland, 10 in Tasmania, and six in Victoria. In Western Australia the whole of the Welshpool factory, with its 62 buildings of a total floor area of 330,000 square feet, had by then been leased to the State Government.

At August 1, 1949, there were 293 separate enterprises engaged in manufacture in former war plants. Of these, 128 were in New South Wales, 88 in Queensland, 24 in South Australia, 19 in Western Australia, 20 in Victoria, and 14 in Tasmania.

The total area disposed of comprised the following types of wartime construction:

(1) Munition Factories .....	6,190,274 sq. ft.
(2) Munition Annexes .....	576,982 " "
(3) D.A.P. Establishments .....	381,719 " "
(4) Dehydration Factories .....	179,216 " "
(5) Grain Alcohol Distilleries .....	240,183 " "
(6) Flax Mills .....	60,774 " "
(7) Warehouses .....	570,700 " "
<b>Total Area Disposed .....</b>	<b>8,199,848 sq. ft.</b>

The following table shows details of disposals in each State and the employment estimates ultimately to result from the establishment of new peacetime manufacturing projects in former war factories:

State.	Factories Disposed.	No. of Firms.	Area Leased or Sold sq. ft.	Estimated Ultimate Employment.
New South Wales .....	23	128	3,245,482	12,540
Victoria .....	20	20	996,296	4,365
Queensland .....	18	88	1,364,312	3,691
South Australia .....	9	24	1,789,102	5,557
Western Australia .....	3	19	395,187	1,456
Tasmania .....	7	14	409,469	1,677
	<b>80</b>	<b>293</b>	<b>8,199,848</b>	<b>29,286</b>

Of the total of 293 firms which have obtained space in war factories, 217 have become established in industrial estates situated on the outskirts of capital cities, 38 are located in inland towns, and 38 in the metropolitan area of various capitals.

The location of these firms within the various States, whether in the cities, country, or industrial estates, is shown in the following table:

State.	Industrial Estates.	Country.	City.	Total.
New South Wales .....	106	17	5	128
Victoria .....	—	14	6	20
Queensland .....	68	—	20	88
South Australia .....	15	2	7	24
Western Australia .....	17	2	—	19
Tasmania .....	11	3	—	14
	<b>217</b>	<b>38</b>	<b>38</b>	<b>293</b>

#### THE WAYS AND MEANS OF DISPOSAL.

Former war factories are to-day housing some of the largest manufacturing plants in particular classes of industry in the Commonwealth. Production of woven rayon textiles, automotive spare parts, garage equipment and radio and electrical equipment are prominent examples.

War factories have also provided the opportunity for industries entirely new to this country to begin production here. Among these are special types of machine tools, new kinds of aluminium

bottle seals, surgical and scientific apparatus, speciality textiles, quick-frozen foods, and special chemicals.

The methods which have been used to dispose of Government wartime factories to private enterprise have varied according to the circumstances of each particular case.

In some instances a complete factory has been sold outright to a manufacturer. For example, the former ammunition factory at Wagga, New South Wales, comprising eight separate buildings, was sold entirely to Dunlop Weatherproof (Aust.) Ltd. for the manufacture of waterproof garments. At Ridell, in Victoria, Henderson's Federal Spring Works Ltd. purchased a former flax mill for conversion to the manufacture of motor springs.

In other instances, factories were divided and sold to more than one industry. An example of this method was the former grain alcohol distillery at Cowra, New South Wales, where the boiler house and other buildings, together with ancillary plant, were sold to the State Department of Public Works for use as an electric power station; while the main production building and silos were sold to the N.S.W. Produce Co. Pty. Ltd. for the manufacture of stock and poultry foods.

However, in the large majority of cases, former war factories were leased to manufacturers. No fixed or standard lease agreement has been adhered to, the terms of lease being varied according to requirements of the parties. Some firms are occupying premises as "tenants-at-will"; others are lessees for periods varying up to 42 years.

In the absence of special circumstances the Government, through the Division of Industrial Development which handles the disposal of former wartime factories, has granted to lessees the right of first refusal to purchase. In almost all cases the lessee has the option of renewal of the lease at the expiry of the first term.

Generally, in order to make the best possible use of such factory space as has been available at a time of general accommodation shortage, care has been taken to see that firms granted sales or leases have been of a type able to make a stable and useful contribution to the general pattern of manufactured production in Australia.

In many instances the industrialists concerned wished to apply for a particular factory. For example, Roots, Ltd., of London, sought the former Armoured Fighting Vehicle Factory at Fisherman's Bend, Victoria, for the assembly of motor cars. Lincoln Mills (Aust.) Ltd. applied for the former aircraft magnesium foundry of Highett, Victoria, for the manufacture of worsted yarns. In other instances the Secondary Industries Commission was approached with a general appeal for assistance as in the case of Burlington Mills Aust. Ltd., who sought a considerable area of factory space for rayon weaving, but had no particular locality in mind. In this instance the Government leased to the Company the former munitions factory at Rutherford, a country town in the coalfields west of Newcastle, in New South Wales, with a floor space of nearly 600,000 sq. ft. This was the first disposal negotiated by the Secondary Industries Commission, and it was the largest single transaction negotiated with private industry. It was an experiment for all concerned. Its success struck a major blow in favour of decentralisation.

The fact that modern factory buildings, together with all necessary services and facilities, were available for industrial purposes was a strong persuasive influence in encouraging industries to move either part or the whole of their activities from Sydney or Melbourne to country centres in New South Wales and Victoria, or to the less industrialised States. The existence of these former munition factories also gave encouragement to many well-known overseas companies to establish manufacturing projects in the Commonwealth.

Firms which took advantage of the availability of former war factories to decentralise to other States include Philips Electrical Industries of Australia Pty. Ltd., who transferred the whole of their works from Sydney to the former munition factory at Hendon, South Australia; Oliver Nilsen Pty. Ltd., of Melbourne, who opened a branch factory at Murray Bridge, South Australia; MacRobertsons Pty. Ltd., also of Melbourne, who established a branch of their confectionary business at St. Mary's, New South Wales; and Lewis Berger and Sons (Aust.) Pty. Ltd., paint manufacturers, who set up a branch plant at Brisbane, in a former munitions warehouse. Silk and Textile Printers Ltd., of Sydney, moved the whole of their activities to Derwent Park, Hobart, while Austral Bronze Co. Pty. Ltd., of Sydney, transferred part of its operations to Derwent Park.

Many well-known overseas companies planning to establish in Australia also found that the availability of space in former munition factories provided an immediate solution to the urgent problem of finding suitable factory accommodation for their enterprises. Bruck Mills (Aust.) Ltd., closely linked with Bruck Mills, of Canada, set up one of Australia's largest rayon weaving mills in a wartime aluminium fabrication plant at Wangaratta, Victoria. B. O. Morris Ltd., machine tool makers, of Birmingham, England, established a subsidiary at St. Mary's, as did another English company, Allen and Hanbury Ltd., manufacturers of pharmaceutical products. Vactric Ltd., of England, established Vactric Electrical Appliances Ltd., at Finsbury, South Australia. The Hollins Mill Co., of Manchester; Rubery Owen and Co. Ltd., English makers of automotive equipment; and Tecalemit Ltd., English garage equipment manufacturers,



are just some of the overseas firms associated with new Australian ventures accommodated in former war factories.

Electricity Meter and Allied Industries Ltd., of Sydney, is a notable example of a substantial industry, employing hundreds of workers, transferring a large part of its activities from a heavily industrialised metropolitan area to a country area, thus providing a first-class case of decentralisation of industry. The former Small Arms Factory at Orange, in New South Wales, which has been leased by the Company, has a floor area of 288,000 sq. feet. Potential employment is in the region of 2,000 workers.

In the case of the very large factories comprising many buildings too large for a single enterprise, the method of disposal was to develop the factories as an industrial estate. Considerable success has attended this policy. As they have developed under the guidance of the Secondary Industries Commission, and later of the Division of Industrial Development, these industrial estates bear some similarity to the trading estates developed in the United Kingdom before and since the war. The British trading estates have been specially-designed factory areas situated some miles outside large towns. Each area consists of a number of factory buildings housing a range of individual manufacturing firms. In some estates there is also a residential housing section, parks, playgrounds, schools, and the usual amenities of modern life.

Australia's counterparts of the overseas trading estates are the community industrial centres, which are now flourishing in what were formerly large munitions factory establishments. Although situated only a few miles outside large capital cities, they are as much instances of decentralisation as the smaller factories inland. In the most highly industrialised State of New South Wales, the existence of St. Mary's, thirty miles from Sydney, has relieved factory congestion in the heart of the metropolis. In the less industrially developed States such as South Australia, Queensland, Western Australia and Tasmania, the existence of large munitions factory establishments on the outskirts of their capital cities has enabled many manufacturing ventures to become firmly established. From each of these community industrial centres comes a diversified range of manufactured products.

While they were all initially developed by the Commonwealth, some of these industrial estates are now under State Government direction. The factory establishments at Rocklea and Derwent Park have been sold to the State Government of Queensland and Tasmania respectively.

The Welshpool factory has been leased to the Western Australian Government, while the Commonwealth has remained responsible for the factory estates at St. Mary's and Villawood, in New South Wales, and Finsbury, near Adelaide, in South Australia.

Surrounding the development of each of the industrial estates is a vivid story of enterprise that makes a vital chapter in the history of Australia's industrial advancement. As the outstanding example of what has been achieved, the story of St. Mary's is told here in detail.

#### THE STORY OF ST. MARY'S (N.S.W.).

Before the last war it would have been hard to distinguish St. Mary's (N.S.W.) from any other small town in the Australian countryside—except possibly by the fact that St. Mary's was older than most. Located 30 miles from Sydney, on the Great Western Highway, St. Mary's began as a frontier hamlet on the fringe of Australia's first settlement. As men found their way across the ramparts of the Blue Mountains, St. Mary's became just one of the towns on the road to the Western Plains.

In 1939, after not much over a century of history, it was still a small hamlet unknown to most people. There was none to suspect that one of Australia's oldest settlements was to be the scene of a bold experiment in industrial development and ultimately in town planning.

War came, and with it a mighty drive to produce the sinews of combat: guns, tanks, shells and ammunition. On to 3,500 acres of the St. Mary's countryside descended a blanket of men and machines. The quiet peace of small farms vanished before the onrush of bulldozer and construction gangs. A huge explosives factory, ultimately to cost £5½ million, was being built.

When the last blow of a carpenter's hammer fell, the St. Mary's factory consisted of 900 buildings, with a total floor area of 1,300,000 sq. ft. It had two full-sized railway stations within its area directly linked to the main western line. The factory was serviced by 22 miles of bitumen-surfaced roadway, by electric power, telephone facilities, sewerage and water. A large number of the buildings were fitted with air-conditioning; all were built on the most modern pattern.

Production commenced, and St. Mary's was fulfilling its wartime purpose.

But what of the St. Mary's of to-day? A third chapter in the history of this small, but historic, township has been opened. As a topline feature of Australia's peacetime industrial expansion St. Mary's is again making history.

The change-over at St. Mary's from a wartime munitions factory to a centre of peacetime manufacturing activity began in January, 1946. At first manufacturers looked somewhat askance at the

idea of settling in a rural centre where there had been no peacetime manufacture before, but factory space in or around Sydney was short. Gradually there was recognition of the advantages of ready-made factory buildings in a decentralised community industrial area with all modern facilities, and with workers available in the surrounding districts.

By June, 1946, there were 23 firms established at St. Mary's. One year later the number of manufacturing projects in operation was 77, and by June, 1948, 89 firms were producing a wide range of peacetime goods, were employing 2,000 persons, and paying between them £12,000 a week in wages and salaries. For the year 1947-48 firms at St. Mary's produced goods worth more than £2,000,000.

The following statistical table indicates the progress made in the development of St. Mary's as a manufacturing centre.

	1945-46	1946-47	1947-48
Establishments in operation	23	77	89
Average Weekly Employment	1,164	1,181	1,980
	M.706/F.458	M.740/F.441	M.1,350/F.630
Salaries and Wages paid	£341,867	£255,970	£588,577
Value of Fuel and Power Used	£25,351	£11,891	£31,284
Value of Materials Used	£379,385	£553,809	£1,007,508
Value of Output (Goods Produced)	£763,085	£963,126	£2,026,081
Value of Production (Value added to Materials and Fuel)	£385,349	£397,426	£987,289
Value of Plant and Machinery	n.a.	n.a.	£792,022

#### Number of Firms in Various Classes of Industry Operating at St. Mary's in 1947-48.

	No. Established.
Treatment of Non-Metalliferous Mine and Quarry Products	3
Bricks, Pottery and Glass	2
Chemicals, Paint, Oils and Grease	6
Industrial Metals, Machines and Conveyances	30
Precious Metals and Jewellery	2
Textiles and Textile Goods	10
Skins and Leather	5
Clothing	10
Food, Drink and Tobacco	7
Woodworking and Basketware	4
Furniture and Bedding	2
Paper, Stationery and Printing	3
Miscellaneous Products	5
	89

The complex problems arising from the simultaneous development of such a wide variety of industries have been gradually overcome by the fine spirit of co-operation which exists between the Commonwealth authorities and private industrialists.

At the same time amenities needed by a large industrial population have not been overlooked. The wartime hostels have been converted to flats to provide emergency accommodation for key workers while houses are being built. In addition, a number of attractive staff cottages located near the works have been made available to industrialists who have leased buildings at the plant.

Co-incidental with the transfer of Government factory buildings at St. Mary's to private enterprise, town planning and additional housing at St. Mary's have also been given high priority.

Far-reaching plans are now in hand to make St. Mary's a fully self-contained community area—a show-place of industrial activity, and the focal point in a comprehensive district plan for the development of an entirely new modern township for St. Mary's to accommodate up to 30,000 inhabitants.

To this end the Commonwealth Government has made available to the State of New South Wales a sum of £10,000 for the preparation of the necessary plan. Housing is being pushed ahead as rapidly as possible, and already the New South Wales Housing Commission has completed 350 homes at St. Mary's and the nearby towns of Toongabbie and Seven Hills, of which 312 have been made available to employees on the St. Mary's industrial area. Hundreds more dwellings are planned for erection immediately.

A modern, well-equipped technical school has been established within the factory area as the first step in the plan aiming at a completely self-contained community in which those who find their livelihood in manufacturing industry at St. Mary's will live nearby in well-planned townships with all facilities for education, recreation and culture close at hand.

It is hardly surprising, therefore, that this ambitious experiment in community living and working has attracted wide attention. Progressive development lies ahead for Australia's first satellite industrial township—a wartime factory with a peacetime future.





# Development of Plastics

## T O - D A Y   A N D   T O - M O R R O W

(By L. G. Harrison, A.P.I.A., Director of A. S. Harrison & Co. Pty. Ltd., Sydney and Melbourne, and N.S.W. President Plastic Institute of Australia)

THE Plastics Trade In Australia is looking forward with confidence to increased business during 1950. This is to some extent a result of the progress that was made in 1949, and also to the additional equipment ordered and installed. The Plastics Industry is fortunate, as improvements in raw materials have frequently increased the production of existing plant. One of the big steps forward was the introduction of Electronic heating some years ago, and more recently of preheating with moist steam. In the Thermoplastic field better Plasticisers have made increased production possible also.

At the beginning of 1949 there was a readjustment in the Plastics Trade. This was resolved and, apart from the coal strike, has led to a high standard of output. A number of firms had record years.

PROBABLY the most outstanding advance in the Plastics Trade during 1949 was the production by C.S.R. Chemicals Ltd., of Cellulose Acetate Moulding Powder. The total project when completed will have a capital expenditure in the region of £2½ million. The factory has already completed its first unit; the second will be in production early in 1950. There are a total of seven units in the finished scheme. The present plant can produce 500-tons per annum of Moulding Powders, and can be extended quite easily. This is subsidiary to the major project of producing the raw material for the manufacture of Acetate Rayon. This will be associated with the £6 million plant that is being established by Courtaulds. C.S.R. Chemicals consider that the production of Cellulose Acetate Moulding Powder is likely to grow because the types and varieties to be offered are much wider in their applications than those previously imported from America.

Of particular interest are the Moulding powders of high Acetyl Cellulose Acetate, which has improved dimensional and thermal stabilities. This means that it is now possible to produce articles with heavy sections such as cutlery handles that can be washed in boiling water or put through restaurant dishwashers without damage or distortion.

Tooth brush handles are now being made from Australian-made Moulding Powders with every success.

Phenyl Formaldehyde Plastics are still used more extensively than any others in Australia. The consumption is about 3,000-tons per year. An additional factory is being established in Victoria by Beetle-Elliott to increase their production. The range of powders available has been extended, with a consequent increase in the standard of the specialised mouldings. These specialised powders are the results of more careful selling now that it is a buyers' market instead of a sellers' market. Colours and wood-finishes are now made in cotton filled powder. These are used to stand hard wear and give good service yet maintain their good looks. Typical of these are the housings for floor polishers, etc., the cotton filling giving a very much better resistance to knocks. For defence work, ammonia free Powder has been produced by a new method. For articles requiring special heat resistance, Asbestos filled powder has been produced.

Production has remained high in radio-cabinets, electrical accessories, and fittings, bottle closures and a host of well-known household and industrial lines. A.C.I. Plastics in Melbourne are installing a 5,000-tons press to manufacture extremely large mouldings. This press is nearly five times as powerful as any other in Australia being used for plastic mouldings.

One of the essential ingredients of the Phenyl Formaldehyde Powders is Phenol. The price has varied over the last twelve months. There has, however, been a steady increase in sales. The Australian Phenol market is influenced to an appreciable extent by the British Phenol market. The U.S. Steel strike greatly reduced the amount of Phenol available on the U.K. market and at the same time the English consumers used up their excess stocks. These movements were reflected in the price paid for Coal Tar derivatives, which also includes Phenol. An increased interest in and additional sales of Cresol have been made. These are mainly for laminating purposes.

The cumulative increase in the costs of Coal have not made the position for Plastics and Plastic Manufacturers any easier.

The manufacture of Amino Plastic Raw materials in Australia has expanded, and although they are more freely available, the demand is still not satisfied.

In addition to Urea Moulding Powders, Melamine Moulding Powder has been produced locally, and care is being taken to maintain the high quality of Mouldings from it.

At this writing, I.C.I.'s 600-ton Amino plastic plant will be operating early this year. It will use raw material from its own English factory and Formaldehyde from their own Melbourne factory. Their Urea Resin plant of 150-tons capacity has been working to capacity, and this is supplemented by Phenol

lic Resins manufactured in at least four other plants in Australia. The resins are being used for ply-wood manufacture and radio-cabinet manufacture, and also water-proof ply-wood for outdoor uses.

Decorative laminated sheets are still being produced by Laminex, in Melbourne, and finding increased markets. The introduction by Beetle-Elliott of a new self-hardening adhesive, which only requires the addition of cold water before use, is a big help in raising the standard of the quality of furniture panels, etc. Research has been undertaken by one firm with particular regard to the use of Thermo-setting Resins in the Textile and Ancillary Industries. Wet Strength Paper is now being produced in Australia from locally made Resins. The Paint Industry is taking larger quantities of Resins both of Urea and Melamine types.

Big increases in the consumption of P.V.C. have taken place. In 1949 it is estimated that about 1,000-tons of P.V.C. and Resins have been used. It is expected that during 1950 this will probably be increased to nearly double that figure. Due to the general price reduction, their use has expanded considerably.

Production is due to start almost immediately at I.C.I.'s Botany plant, which has been designed to produce 1,000 tons per annum. At first, compounds will be made, and these will include the general dielectric grades which are meeting with increasing demand for cable sheathing.

Calendered sheeting is already being produced in Australia. This is used in making many of the household lines such as aprons, covers, shower curtains, hospital sheeting and inflatable toys. Car upholstery and public transport upholstery is now very extensively being made from raw materials covered with P.V.C. in Australia. New York is going on with such things as gloves for handling chemicals, insulating handles such as wire pliers used by linesmen, etc.

The use of Alkathene semi-rigid inert plastic has expanded. In addition to the range of agricultural tubes, beakers, bowls and ice cube trays being produced, there is the outstanding development by Industrial Products, Adelaide, of a 3½ gallon chemical container for packing Acids, etc. This is probably the largest injection moulding made in Australia as it weighs 4½ lbs.

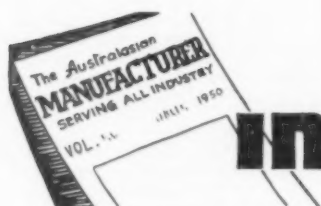
In Perth, production is commencing in the manufacture of thin collapsible types from Alkathene. Plastics Designs Ltd., of St. Marys, N.S.W., are now lining chemical plant and equipment with Polythene sheeting. This has already been a considerable help to chemical plant manufacturers.

(Turn to page 268)



Mr. L. G. HARRISON





# Digest of the INDUSTRIAL YEAR

(The following article discusses and records—in brevities—the outstanding events which have occurred in the Australian industrial world during the year 1949.)

Throughout 1949, manufacturing progress and development continued at the same accelerated tempo as has characterised the Australian post-war economy. This is evident from the fact that the new capital — £46,393,488 — which flowed into Australian industry during 1949 constituted an all-time record. An additional £10,427,750 was subscribed by company and public utility debentures, making a grand total for the year of £56,821,238.

Indeed, the ten-year period 1939-1949 ranks as the most prosperous manufacturing decade in the history of Australia, the value of factory production increasing during that time by £286,000,000, with the number of factories rising from 27,000 to over 37,300. To-day, one in every three Australian workers earns his or her living in the secondary industries.

The decision of the Governments of the Commonwealth, of New South Wales, and of Victoria, made early in the year, to implement with all possible speed the Snowy River Hydro-electric project was unquestionably one of the most important decisions ever reached in the history of this nation. For the scheme will not only be the most gigantic ever undertaken in Australia. It will also effect profoundly every facet of the national life. First, it aims to provide secondary industries with the additional power they so sorely need. Second, it will provide water for the rich Murray Valley and adjoining pastures as well as electric power for many of Australia's most important rural areas. And third, it will have a vital bearing on national defence.

Estimated cost of the scheme is £166,000,000 and its completion will occupy some twenty-five years. It comprises the three following main proposals:—(1) To divert water from the upper reaches of the Snowy, Murrumbidgee, and Murray into the Tumut River; (2) To divert some Snowy River water into the Murray River, upstream from the Hume Reservoir; (3) To divert the remaining water of the Snowy into either the Murray or the Murrumbidgee.

Under the plan, twenty hydro-electric stations will be constructed. Their total output will be 1,500,000 kilowatts.

February, 1949, saw the production of Australia's first jet plane, a Vampire. It was built by the de Havilland Aircraft Company at its factory at Bankstown, New South Wales. It is powered by a Nene turbine jet, manufactured by the Commonwealth Aircraft Corporation under licence from Rolls-Royce. The plane is

the first of fifty being built for the Royal Australian Air Force.

Unquestionably, one of the most important happenings of the year was the dismissal by the Privy Council in London of the then Commonwealth Government's appeal against the decision of the High Court of Australia declaring invalid the Banking Act of 1947,

**Privy Council Rejects Bank Nationalisation.**

which Act sought to nationalise banks throughout Australia. The Privy Council declared that it had disallowed the appeal because Section 46 of the Act clashed with Section 92 of the Commonwealth Constitution, Section 46 of the Act empowering the Federal Treasurer to order a bank to cease the conduct of business, while Section 92 of the Constitution affirms that trade, commerce, and intercourse among the States shall be absolutely free.

Undoubtedly the most disastrous event of the year was the general strike of miners on the coalfields of Australia. The struggle, which lasted seven weeks, brought to a virtual halt the manufacturing industries of the nation, threw hundreds of thousands of workers out of employment; inflicted grievous hardship on all the citizens of the Commonwealth; and reduced the production, therefore the wealth, of the nation by upwards of £140,000,000. Australia lost, in fact, 2,040,000 tons of coal; the coal miners £1,802,000 in wages; and her other workers, £34,000,000.

Fortunately for Australia, the then Prime Minister, Mr. Chifley, stood firmly for the principle of arbitration, insisting that the miners' claims should be heard and adjusted only by the legally-constituted tribunals established for that specific purpose.

When, after seven weeks, the strike was settled along these constitutional lines, and coal-mining operations were resumed, record output was achieved on a number of occasions before the Christmas holiday break.

In the field of private enterprise, the major happening of the year was the decision by Courtaulds Ltd., England, to establish at Tomago, near Newcastle, New South Wales, a £10,000,000 rayon industry for the production of both viscose and acetate rayon yarn. The undertaking is sponsored by Courtaulds Ltd. and leading Australian industrial and financial interests, including the Australian Mutual Provident Society and the Colonial Sugar Refining Co. Ltd.

Developments are taking place over the entire textile field. This was revealed in a

**Australia's Rayon Looms to be Trebled.**

Review published by the Division of Industrial Development of the Department of Post-War Reconstruction, which pointed out that Australia's existing seven hundred rayon looms will, by 1952, number two thousand one hundred and sixty-four, making possible in that year an output of 34,000,000 square yards of rayon.

The production of motor trucks in Australia took an important step forward by the opening of new motor truck works for the International Harvester Company of Australia Ltd. at Geelong, Victoria.

**Australian Motor Trucks.**

The company plans to spend over £1,600,000 on the project. The first three models are to be 10-15 cwt. utility, a 20-30 cwt. light truck, and a 2½-4½ ton medium heavy truck. Engines and various chassis components are to be produced at Geelong.

A licence was granted during the year by the Elanco Corporation of U.S.A. to Tutt Bryant Ltd., Rydalmere, New South Wales, to manufacture in Australia Elanco rocker shovels. The agreement was concluded following the announcement by the Governments of the Commonwealth, New South Wales, and Victoria to proceed with the implementation of the Snowy River Hydro-electric scheme.

Heybridge, near Burnie, northern Tasmania, is the location of the first factory in the

**Australia's First Titanium Pigments Factory.**

Commonwealth to engage in the manufacture of titanium pigment paints. The new enterprise, Australian Titan Products Pty. Ltd., is an offshoot of British Titan, which, over a long period of years, has supplied Australian rubber, plastic, linoleum, paper, and associated industries with titanium pigments. The initial output planned is five tons a day, or 1,800 tons a year. During the first year, output is to be stepped up to seven tons a day, and subsequently to ten tons.

The year saw the opening at Paisley, near Melbourne, of a new refinery for the Vacuum Oil Co. Pty. Ltd. Constructed at a cost of £1,000,000, it is capable of treating over 15 million gallons of crude oil a year.

Refining of crude oil will produce distillate fuel oil (27 per cent.), lubricants (30 per cent.), road-paving bitumens (25 per cent.), and petrol (18 per cent.). Of special significance is the fact that, with the exception of certain equipment unprocureable in Australia, all the components of the plant were made within the Commonwealth. Furthermore, it will be operated by an all-Australian staff.



The manufacture of water-proofed spark plugs was initiated during the year by S. Smith and Sons (Australia) Pty. Ltd., Haberfield, New South Wales. Originally designed to meet the exacting conditions of England's T.T. racing and motor-cycling mud scrambles, the water-proofed type derives from the aircraft plugs which were specially shielded to combat interference with radio signals. This original design, with modifications, resulted in a water-proof spark plug. Most standard types are already available, and production plans for other types and sizes are well under way.

#### Production of Water-proofed Spark Plugs.

A new glass manufacturing works was established during the year at Moonah, Tasmania, by Australian Consolidated Industries Ltd. A large portion of the requisite plant was manufactured in Australia.

#### Glass Factory at Moonah, Tas.

The construction by Australian Iron and Steel Ltd. at Port Kembla, New South Wales, of a new battery of forty-eight coke ovens and of the merchant bar, rod, and strip mill is proceeding satisfactorily. Main scheme of expansion envisages the erection of another battery of twenty-four coke ovens, designs for which already have been completed. Excellent progress marks the erection of the hot and cold strip mill, major portion of the designs and plans of which have been obtained from the United States.

South Australia's industrial centre, Whyalla, passed an important milestone during the year by producing steel for the first time in its history. Ship-building operations also proceeded at a satisfactory tempo.

#### Whyalla, S.A., Produces Its First Steel.

An ultra-modern skelp and strip mill was installed at the Newcastle steel works of the Broken Hill Pty. Co. Ltd. in order to keep pace with the ever-growing demand for skelp and strip products. Speaking at its installation, Mr. Darling, general manager of the company, declared: "There must always be a recurring expenditure on work of a construction nature if our steel plants are to remain efficient and up to date." Therein lies the explanation of the outstanding efficiency of this mighty enterprise and of its production of high quality steel at the lowest price in the world.

A major industrial happening was the embarking by the Colonial Sugar Refining Co. Ltd. on a £2,000,000 project for the local manufacture of plastics. Australian raw materials are to be used in production wherever this is possible.

Special interest attached to a demonstration by Lewis Berger and Sons (Australia) Ltd. at their factory at Rhodes, N.S.W., of a unique and exclusive range of surface finishes developed by the Berger Group of Companies. The "Dimenso" finish, for example, is obtained by the use of a patented gun which sprays two component finishes of specially formulated material in one operation and at the same time. By

means of nozzle adjustment and control of viscosity, the operator is able to produce an extensive variety of patterns and effects, such as hammered or spot, toned hammer or diffused.

Mr. Stanley Robson, director-general of research and development for the group of

#### Plans to Increase Sulphuric Acid Production

industries governed by Imperial Smelting Corporation and Consolidated Zinc Corporation, accompanied by Mr. A. T. Rogers, chemical engineer of the group, visited Australia during the year with the object of completing plans for improvements and extensions to the group's various plants in Australia. Among the projects are large-scale developments at the works of the Sulphide Corporation Ltd. at Cockle Creek, New South Wales, where it is proposed to increase vastly the production of sulphuric acid.

The year under review witnessed the setting up by Moldex Ltd., Victorian plastic manufacturers, of a department for the manufacture of plastic leather. This new material is utilised for the upholstery of motor cars, furniture, and the like.

#### Local Production of Plastic Leather.

Plans in process of implementation by the Ford Motor Company of Australia will ensure that, by the middle of 1952, Ford cars and trucks will comprise approximately 35 per cent. locally manufactured content, expressed in terms of factory costs.

Eventually, moreover, the company plans to manufacture in Australia most of the components which will still have to be imported when the present plan reaches fruition.

Horlicks Pty. Ltd., one of the world's best-known makers of milk products, is erecting a new factory at Nowra, on the south coast of New South Wales. Costing £250,000, its output will help to meet present export demands. It is anticipated, moreover, that on completion of this up-to-date factory, Australia will rank as the testing-ground for all the company's new products. Up to the present, all export needs have been met by the English company. Latterly, however, Australia and New Zealand have been invited to assist in the export trade.

A new factory, established in partnership by three of Britain's leading cable manufacturers, will manufacture, claimed to be for the first time in Australia, paper-insulated cables. Other products will include copper wire and strands and a full range of covered copper wire for all electrical purposes. The three British organisations are the Liverpool Electric Cable Company Ltd., W. T. Henley's Telegraph Works Co. Ltd., and Enfield Cables Ltd. The new factory, when in operation, will employ several hundred people.

The month of May saw the inauguration of the Commonwealth Scientific and Industrial Research Organisation. This new body supersedes the Council for Scientific and Industrial Research. The chairman is Dr. Clunies Ross, other full-time members being Dr. F. W. G.

White, Chief Executive Officer; Dr. S. H. Bastow, and Messrs. D. A. Mountjoy and H. J. Goodes. Sir David Rivett, while relinquishing office as chairman of the Council for Scientific and Industrial Research, consented to act as chairman of the new Advisory Council.

Reeco Ltd. extended their manufacturing operations to Tasmania during the year by establishing at Launceston a new industry, Reeco Bearings Ltd., which is engaging in the manufacture of motor engine bearings, etc. It provides employment for upwards of eighty workers, mostly men.

The acquisition of a new factory site by John Danks and Sons Ltd. marked an important milestone in the history of the undertaking. The location is Maribyrnong, some six miles distant from Melbourne. The site covers twenty-three acres, and on it was erected an up-to-date plant for the manufacture of engineering, plumbing, and building materials.

An important industrial event of the year was the bringing into full production of the Faraday Park factory, Meadowbank, New South Wales, of Telephone and Electric Industries Pty. Ltd., which engages in the manufacture of the latest type switching mechanism. The occasion was marked by the visit of Sir Thomas Eades, managing director and vice-chairman of the Automatic Telephone and Electric Co. Ltd., of Britain. The Australian venture is jointly sponsored by the British company and a number of other important overseas organisations.

#### Locally-Made Modern Telephone Equipment.

An interesting Australian-British-American venture is Textile Cones and Tubes Pty. Ltd., which engages in the manufacture of cones, pirns, tubes, and spools for Australian textile industries. Participants in the organisation are Hygienic Containers Pty. Ltd., Sydney; Morris and Walker Pty. Ltd., Melbourne; the Textile Paper Tube Co. Ltd., England; and Sonoco Products, United States of America. One plant operates in Sydney, the other in Melbourne.

The period under review saw the conclusion of an agreement between Sidney Cooke Ltd., printers' furnishers, Sydney, and the Intercolonial Corporation of New York, for the establishment of a subsidiary in Australia. The new undertaking, Sidney Cooke (Printing Inks) Pty. Ltd., will manufacture, under licence, printing inks produced in the United States by International Corporation. These new inks, by the way, will be additional to those already being produced locally by Sidney Cooke Ltd.

The year witnessed the inauguration of production of latex foam products by Binlatex (Australia) Pty. Ltd. at their plant at Fisherman's Bend, Melbourne. For the time being, chief emphasis is being laid on the manufacture of latex foam fillings for mattresses, for car and theatre seats, and for clothing accessories.

#### Binlatex (Australia) Initiates Production.

(Continued on page 268)



# "LIBRARIES AND THE MANUFACTURER"

By G. C. Remington, Deputy Chairman of the Library Board of New South Wales.

COMMERCE and Industry have learnt, more slowly in this country than in America, but still have learnt, that study and research are essential not merely for progress, but for survival in the struggle for existence.

"The Public Library is . . . an engine of great potentialities for national welfare, and the essential foundation for progress without which no people can hold its own in the struggle for existence."

This statement was made in a report made by a Committee appointed by the Board of Education in England in 1927.

MODERN industry depends on technical knowledge and technical knowledge is contained in books, periodicals and other printed material. No longer is it possible for a manufacturer to succeed because he is "a good tradesman" or is "good with his hands." Some manufacturers seem still to believe almost exclusively in trial and error methods and practical experience. They



Mr. G. C. REMINGTON,  
Deputy Chairman of the Library  
Board of New South Wales.

are not impressed with "all this theoretical stuff" which is set out in books, but this is a very impractical way to treat the result of research, experimentation and practical experience elsewhere.

The job of the business librarian is to collect, collate, assemble, and make available to the executive and the technician when they want it, information, "know how," which is the result of research experience elsewhere.

Industry in Australia is particularly in need of research libraries. Compared with the United States, England and European countries, Australia does not and cannot afford to do very much research for manufacturing purposes. Australia does not produce much "know how," or at least not enough to enable her to keep her manufacturing industries efficient and up-to-date.

The manufacturer is, in fact, dependent on printed information whether it be technical books, trade catalogues, printed statistics, articles in a periodical, blueprints or photographs. Reference to printed material will often solve the problem of the executive, technician or minor employee, but the manufacturer is handicapped by not having on hand information when he needs it most. He may

have some general recollection of having seen an item somewhere which dealt with his problem. A well organised library in charge of a trained librarian will solve this difficulty.

This library should be a separate department not working under any division or section, but answerable to the Managing Director or head of the business, and not be supplementary to any of the operating divisions. Its purpose is to serve equally the needs of all departments. "It is the information hub into which all the departmental spokes run, and should not discriminate in favour of the work of any one department which it is very likely to do if it is more closely associated with the work of one than it is with the work of others." It is the place where all the printed resources of value to the organisation are collected and distributed.

Essential to the library is a trained librarian. It is just as important that the librarian should be trained as it is that the engineer, accountant, toolmaker, process worker or stenographer should have the qualifications necessary to enable them to carry out their own particular work efficiently. Librarianship is a profession and not just a sideline which can be picked up by anyone who has some experience of general office work or perhaps other technical training. A librarian must have a good educational background and have then acquired "a thorough knowledge of library technique, by which is meant, the knowledge of library administration, systems of classification, cataloguing, organisation of alphabetical-subject files, and sources of all printed information."

Then the business library should be properly housed and equipped. Employers do not hesitate to provide up-to-date equipment for their employees. They purchase efficient mechanical equipment for their workshop and adding machines, typewriters and appropriate furniture for their offices. The library should also be equipped with proper shelves, filing cabinets, vertical files, index cards.

Having got the librarian and the library it might be thought that it was high time to have books and other printed material, but in practice these can only be acquired slowly and carefully. What the business man wants is information and books are only a means to that end.

In every large community there are public and other libraries which can be legitimately used by the

business librarian on behalf of his firm. Public reference and lending libraries have material on all subjects for the use of any member of the public; there are the libraries and information services of Government Departments, especially created for research in the public interest, such as C.S.I.R.O. There are University and Technician College libraries and libraries established by trade associations. The librarian of a particular business can extract information from these existing libraries, sometimes borrowing books, sometimes taking notes or having extracts copied; sometimes getting photoprint and photostat copies. These can go into the files of the firm's own library. Certain books and periodicals will then be found to be so essential that it will pay the firm to buy them and place subscriptions.

It is then common practice to "route" these and especially the incoming issues of journals, to staff members, drawing attention to articles that the librarian thinks will be of interest and use. In some cases a bulletin is circulated in which new material is abstracted or digested. But the busy executive should not think it is his duty to read constantly and widely. He should do what he can to keep abreast of new ideas, but should take care not to get indigestion.

The all important thing is to be able to get pin-pointed information if and when it is wanted. With proper organisation the librarian is able to say immediately what is in a firm's own files, and he is able by telephone or personal call to check the resources of

other libraries and to bring everything that is available immediately to bear on the subject on hand.

Be wary of "services" which offer all the latest information on technical problems submitted to them at what appears to be a reasonable price. Very often they only dress up something that is readily available in libraries, even in the firm's own library, and charge a very stiff price for what is not original work in any sense. Only the firm's own librarian and information officer will know just what the firm's angle is and will be able to cut corners and get just what is wanted.

In conclusion, it may need reiteration that the library is only a means to an end. The business man is not being asked to do a lot of reading for its own sake. He is not even being asked to read although it is worth keeping in mind the American Foundrymen's Society slogan, "The man who doesn't read has no advantage over the man who can't." He has been asked to set up at relatively small cost an organisation that will save him time and labour of reading, to set up what is called a "library" because it will include some books and is best run on library lines, but it is essentially an information service or intelligence department. The need for knowledge is becoming recognised. A survey made in 1949 by the Rotary Club, of Sydney, amongst its own members showed that 81 businesses maintained libraries; of these 25 employed trained librarians—very few of these libraries existed five years ago. All of them are being developed to meet the needs of the businesses they serve.



Marrickville (N.S.W.) Municipal Library aids local industries. Mr. John Ellis, a member of the Library Staff, checks the volumes on the shelves of the Bookmobile before visiting a factory in the Municipality.

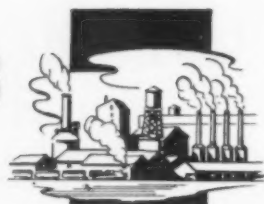




# Victoria's MANUFACTURING INDUSTRIES

## FIFTY YEARS OF PROGRESS

By Mr. E. F. Atkins, President of the Victorian Chamber of Manufactures.



VICTORIA, in point of size, is the smallest of the States of the Commonwealth, but relatively it is the most highly developed industrially. During the last fifty years it has emerged from what was, at the turn of the century, mainly a rural State, with manufacturing industries concentrated in three or four cities, into a flourishing industrial and commercial community, with factories or workshops established in practically all towns, with a minimum population of 1,000.

TWO world wars undoubtedly contributed to Victoria's industrial development, the greatest expansion taking place between 1914 and 1939, as will be seen from the following table of relevant statistics:—

	1914/15	1938/39	1945/46	1947/8(a)
No. of Factories	5,650	9,250	10,195	11,661
No. of Employees	118,399	201,831	256,249	278,267
Wages paid	£11,099,940	£36,026,542	£70,499,214	£93,805,962
Value of Output	£49,439,985	£152,967,611	£286,989,408	£377,645,161
Value of Land and Buildings	£11,248,120	£42,026,245	£60,264,953	£66,184,141
Value of Plant and Machinery	£10,727,526	£38,626,743	£58,537,394	£65,828,923

(a) Subject to revision.

It will thus be seen that while both the number of factories and the number of employees have a little more than doubled in a period of 34 years (1947-48 are the latest figures available), the value of output has increased by about 7½ times, Land, Buildings, Plant and Machinery by approximately 6 times, and Wages by nearly 8½ times.

An interesting feature, and one worthy of note is that the proportion born by Wages, and Margin for Profits, miscellaneous expenses and charges, to the value of final output was in 1914, 22.45% and 17.29% respectively, and in 1947/48 wages had risen to 24.84%, while the margin for profits, etc., had dropped to 17.22%.

Another interesting figure is that in 1929/30, when the above percentages were 23.12% (wages) and 18.62% (margin for profits, etc.), the percentage of wages on value of production was 55.38%. In 1947/48 this percentage was 59.06%.

So much for the "bare bones" of statistics, which, however, give little idea of the romance of Victoria's industrial development. For the foundations upon which this development has been built we must look back to 1867, when the Victorian Parliament first imposed customs duties upon certain classes of goods. These duties were extended in 1871, thus affording encouragement to manufacturers to establish and enlarge industries which could not hope to survive in the face of competition from older, more favoured countries. This gave Victoria a tremendous advantage over the elder State of New South Wales—an advantage which the latter did not overtake until the Commonwealth Government adopted a general protectionist policy, thus extending the benefits of the tariff to all States.

Victoria's natural resources include the inestimable benefit of possessing vaster deposits of easily mined lignite, or brown coal, than any country in the world. This coal is of immense value in the production of electricity, and of latter years it has been pressed more and more into the service of industry, to relieve to some extent the hardships caused by shortages of black coal from other States. Industrial consumption of lignite jumped from 78,863 tons in 1945 to 1,000,000 tons in 1949, and further research is being made to ascertain still wider uses to which it can be put. The use of brown coal

in industry necessitates the adaptation of boilers, furnaces, etc., built for the use of black coal, but industrialists are co-operating to the utmost of their ability in this respect in an effort to make the State independent in regard to fuel.

During the post-war period, decentralisation has played a large part in the expansion of Victoria's industries. Since the war particularly, depleted manpower has been one of the greatest retarding factors in this, as in other States, and it was realised that the main cities were becoming over-crowded and their supplies of available artisans exhausted. It was also realised that country centres offered possibilities of development, especially to such industries as clothing, textiles, and those employing mostly female labour.

Early in 1946 a Ministry of Decentralisation was appointed, and under its auspices regional and other planning committees were set up after consultation with interested organisations, including the Victorian Chamber of Manufactures and the Melbourne Trades Hall Council. The object was to provide a complete tie-up between primary and secondary industries, and avoid the waste previously incurred by hauling raw materials hundreds of miles to centralised factories for manufacture.

Rural districts thus opened up included Portland, Seymour, and the Goulburn Valley, Wangaratta, Coloma, Kerang, Bunyip, Charlton, Hamilton, Colac, Kyneton, Rutherglen, Toora, Warrenheip, Wycheproof, Talbot and Horsham. By April, 1946, 21 new industries had been established in these, and other, country centres, covering such varied industries as shirts, hosiery, stationery box manufacture, knitting, textile and silk mills, agricultural implements, tanning, footwear, clothing, scientific instruments, bicycle saddles, and food products. Modern factories were erected, equipped with all amenities, and families which hitherto had been faced with separation or only seasonal employment, were thus provided with pleasant, profitable and constant work which enabled homes to remain united.

Attention was next directed to Gippsland, where "decentralisation" had been commenced five years previously with the establishment, in 1943, of a frock factory at Warragul, which employed about 100 girls—a branch of a well-known Melbourne firm.

Two years later this was followed by a rope and cordage factory, and in May, 1946, by a new industry, the production of linen thread—an offshoot of the rope and cordage factory. Other Gippsland districts to share in the industrial expansion included Beaconsfield, Traralgon, Sale, Bairnsdale, Cranbourne and Lang Lang.

And so the gospel of decentralisation is spreading throughout the length and breadth of Victoria. As far north as Mildura; from Casterton, in the west, to Orbost, in the east, factories are springing up, and the security of constant employment brought to districts which hitherto offered only the uncertainties of seasonal work.

Every effort is being made to co-operate with industries requiring seasonal labour, as, for instance, in Mildura, where a boot and shoe factory was established which works only nine months in the year, closing for the other three months to release employees to harvest the dried and citrus fruit crops. Factories located in districts demanding seasonal workers use that period to overhaul plant and machinery.

Decentralisation has involved the capital expenditure of many millions of pounds, but it has definitely checked the very serious drift to the cities which was threatening the stability of rural life, has been the means of extending housing and many amenities more evenly over the State, increased production, and provided work for thousands of people within reach of their homes. Water is supplied at Melbourne rates, a uniform tariff operates for electricity supplied by the State Electricity Commission, and where this is supplied from a local authority at greater cost the difference is subsidised for an initial period of two years. Building operations are sponsored, and individual workers desiring to move their homes from Melbourne to a decentralised industry receive valuable concessions.

The most spectacular industrial development is, perhaps, the recent transfer of a complete Yorkshire Spinning Mill—plant, machinery and personnel, including wives and families—from Cleckheaton (England) to Shepparton, Victoria. On 26th August, 1949, in the presence of a distinguished gathering, and a number of future employees who had landed that day from England, the Premier of Victoria (Hon. T. T. Hollway) laid the foundation stone of the new building. Early in January, 1950, the first of the machinery began operating, and the 32 work-people who came from Yorkshire will form the nucleus of an initial total of 70 (eventually increasing to more than twice that number), mainly recruited from the local population.

It will be seen, therefore, that the last fifty years' history justifies Victoria's claim to being the "most highly developed State, industrially, in the Commonwealth." In 1948 (the latest figures available) of Australia's total of 848,872 employees in manufacturing industries, nearly one-third were situated in this State, while Victoria contributed about the same proportion of the Commonwealth's output of factories.

(Turn to page 263)



Mr. E. F. ATKINS,  
President of the Victorian Chamber of  
Manufactures.





# THE BALL IS AT OUR FEET



By Maldwyn D. Davies, President of the Queensland Chamber of Manufactures.

IN the latter part of 1949 practically every manufacturer in Australia declaimed about the necessity for supporting free enterprise, and, as the outcome of his efforts and of others, the Socialist Federal Government was defeated. The Liberal-Country Party coalition has been charged with the government of Australia on the specific undertaking that free enterprise will be given every opportunity to justify itself. Subsequent statements by members of the new Cabinet have endorsed and emphasised this undertaking.

Manufacturers, therefore, start the second half of the century full of optimism that there will be no artificial hindrances to their development and progress. However, in securing the right to be optimistic they have also accepted heavy responsibilities, and I feel sure that as a president of one of the Australian Chambers of Manufactures it is my duty to bring before all manufacturers the importance of these obligations. If we accept them in the way we should, we, as well as all other Australians, will proceed from triumph to triumph, and the millenium will be brought that much closer. However, should we neglect our responsibilities, we must accept no small measure of criticism for the resultant disappointments.

IN the first place I think it is essential that the manufacturers of Australia should fully appreciate the significance of the expression "Free Enterprise," and ensure that they give it a liberal interpretation. A dictionary meaning of "Free" would be: "absence from bondage," "having complete liberty." "Enterprise" may be defined as "bold or difficult undertaking requiring courage." I submit that if manufacturers are to live up to the meaning of Free Enterprise — which the country as a whole has endorsed — it will require a very strenuous effort on the part of every individual.

The ball is now at our feet, let us ensure that we kick a goal.

I feel sure that the majority of manufacturers only need to have this brought to their notice and they will conscientiously strive for perfection. If we look at the problem objectively we shall see that in striving to help the community we also help ourselves.

The inflationary tendency, which was obvious from the termination of the war, has become stronger, until we find that in the year 1949 living costs increased practically 10%. It will need great courage on behalf of the Government and the people if we are to correct this tendency soon enough to avoid hurting ourselves.

Because the Socialist Government's policy was to make the population dependent upon Government action, all of us have tended to assume that the antidote for this inflation was solely a Government responsibility. Admittedly, the Government must take the initiative. It must provide leadership and, above all, it must ensure that all of its own actions are such as to restore the balance between money and goods, but it is up to us, the working population, to accept the leadership, if and when offered by the Government, and to ensure that its general policy is implemented.

Unfortunately, too many of our manufacturers have fallen into the habit of depending upon the Government, and have called upon officialdom to solve our problems. Under the circumstances existing at that time there was probably no alternative, but in consequence the resourcefulness and the initiative of the individual have given way to subservience to political whims. Failure to overcome hardships has been excused by the individual as something beyond his control; let us regain our initiative and resolve to carry our own burdens. Let us also resolve only to approach the Government to remove restrictions, but under no circumstances seek Government assistance when resourcefulness and energy will give us an even better result.

I am particularly concerned that one of the serious results of price control has been to make the average manufacturer more price-conscious than ever before, and, as a corollary, has reduced his production-consciousness. Fifteen years ago if one item of cost of a

manufacturer's product was increased, he could not afford to increase his price except at the risk of losing a volume of his turnover to his competitor. Therefore, his first action was to find ways and means of reducing other items of cost, or to increase his turnover to carry the added cost. The sooner manufacturers approach their particular problems in this way the better it will be for all. Increasing the price to compensate for increased costs



Mr. MALDWYN D. DAVIES,  
President of the Queensland Chamber  
of Manufactures.

may be a logical way out, but it is certainly the most dangerous.

One of the ways in which many manufacturers could reduce their costs is by more efficient supervision in their factories. Admittedly, we have found that a large percentage of the so-called working population is more concerned with reducing its efforts, but I am certain that the average Australian is still a decent man, and will react to efficient leadership. Just the same as I have claimed that Government leadership will find a response from manufacturers, so I maintain that managerial leadership will find a response from employees.

The conservative proprietor, who considers that grandfather's methods are good enough for him, must make way for the progressive man, who is not afraid to adopt new processes and, if necessary, to swing over to new products.

Now is the time when every manufacturer must strive to improve his product, both as regards quality and value. As I look round and consider the living conditions of many Australians, I realise what tremendous scope there is for wide-awake manufacturers to provide large quantities of useful domestic articles at a price which can be paid by all. By the same token, I also believe that there are many avenues for Australian manufacturers to produce useful equipment for business and commerce generally. Particularly, there are marvellous opportunities for the man who will supply labour-saving devices to both home and office on an inexpensive basis.

Freedom from Socialist control is not the only freedom which we must accept and adopt. We must free ourselves from our inhibitions and many of our preconceived ideas which were responsible for the growth of the Socialist ideology. One of the frailties of human nature is to interpret a problem completely from the personal viewpoint, utterly disregarding the position of others. In my opinion, we must not endeavour to use our newly-found freedom against the interests of any other national of this country. In other words, we must be big and liberal in our outlook. Let us all devote our thoughts to the bold and courageous undertaking upon which we have embarked. The defeat of the Socialist Government has removed our greatest alibi for lack of success. Now, every manufacturer is, or should be, thrown on his own resources. The game will be won by the man who gives the most thought and consideration to his training and preparation.

For Heaven's sake, don't let us go to the new Government pleading for assistance. Let us strive by all the means in our power to have the last shackles removed. Let us have a complete review of all Federal legislation which may in any way restrict secondary industry, and let us, in a forthright manner, urge that every law which handicaps us, or our competitors, be eliminated.

By this I do not suggest, for instance, that Australia should become a free trade country. For many years now it has been the policy of this country to protect its industries, primary or secondary, from competition from low-wage countries. This is essential, but I strongly deprecate the use of our tariff system to provide protection for uneconomic or badly organised industries. For too long has a section of Australian industry relied upon the Government to make it possible for them to continue in business, either by restrictive legislation or prohibitive measures.

Let the match be won by the most efficient. Let the Government see that the pitch is in good order and free of hurdles, and let the Government also provide the umpire if necessary. Given this, let the manufacturers prove they are worthy of their inheritance.



# Tasmania's SECONDARY INDUSTRIES

THE Tasmanian Chamber of Manufactures recently entered its 50th year. The Chamber is small in comparison with those of eastern mainland States, but it is fully representative of manufacturing industry throughout Tasmania and its growth, like that of manufacturing industry in Tasmania is steady and certain. Adequate hydro-electric power available in all parts of the State, suitable sea ports for every transport, speedy air transport for lighter goods, and abundant markets in the larger centres of population on the mainland, all these factors go to make Tasmania an ideal State for manufacturing.

By R. J. Foot, President, Tasmanian Chamber of Manufactures

IT is now 50 years since Federation, and I feel it may be of interest to pause and take a look at the progress of our Secondary Industries during this period. When we joined the other States in forming this great Commonwealth, in 1901, Tasmania had many small industries, chiefly of a domestic character. Of manufactured products for export we had little or none.

With Federation, existing industry suffered serious setbacks. The larger States, with their bigger populations, could and did strike very grievous blows at our economy. In this respect Tasmania perhaps was the worst sufferer, not only in industrial life, but also in population. We were not able to absorb our natural increase, and young people were forced to look elsewhere for employment. Victoria and New South Wales benefited particularly at our expense. These young people, after being born, reared, educated and trained for industry here, were forced to the mainland to find work. It cost our State countless thousands of pounds and what a boon it was for others to find splendid, healthy and well trained young operatives at their front doors, ready to be absorbed into their rapidly expanding industrial life.

We were developing our Island steadily in spite of these drawbacks, but mainly as a primary producing State. Mining contributed very considerably to our struggling secondary industry, and if it had not been for this, we would have been in a much worse plight.

I think it right to say that up to 1912-14, from a manufacturing point of view, we were right down in the doldrums. But we were not without very great natural resources. In fact, in many ways Tasmania is best endowed of all the States.

Nature has placed in the centre of the island and at an elevation of about 3,500 feet, great quantities of fresh water, and this potential was to prove the making of the State as an industrial centre. In 1911 a private company, The Hydro-Electric Power and Metallurgical Company, undertook the installation and develop-

ment of Hydro-electric Power from this source. In 1914 the assets of this company were purchased by the State Government, and placed under the direction of a Hydro-Electric Department and under this authority the scheme has been vastly expanded and developed. In May, 1916, two 5,000 h.p. generators were installed and now, after 34 years, stations developing 166,000 h.p. are spread throughout the highlands. This output can be and is being increased as quickly as available materials come to hand and is still capable of very great expansion. It is a striking fact that almost 75 per cent. of the water power of Australia is located in this State.

Naturally, our industrial expansion is closely linked with this large scheme and the two have kept growing apace side by side. In fact, our industrial development is limited only by our available power.

Now to give some indication of the types of industries founded and developed principally during the past 25 to 30 years:—

Tasmania's climate is especially suited to the needs of the Woollen industry, and the second oldest Woollen Mill in the Commonwealth is situated at Launceston. Operated by the same family interests since it was founded, it is now controlled by the third generation. There are also several other very large Spinning and Weaving and Knitting Mills in operation.

The paper-making industry is now well established. Very large works at Burnie make Superfines, Bonds and Printing Papers, and at New Norfolk newsprint mills are well into production. Both plants are expanding rapidly.

At Risdon very large zinc works are producing most of Australia's needs, and at present, under erection at Bell Bay, on the Tamar, is a huge mill for the manufacture of aluminium. This plant, which will use a very big block of power, promises to develop into the largest industrial unit in the State.

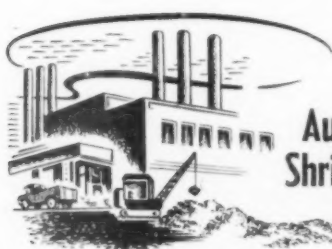
Then there are hundreds of smaller factories and mills, side by side with their bigger brothers and all busy and prosperous. They are spread from one end of the Island to the other. In fact, one of the most pleasing features of our expanding economy is its decentralisation. Tasmania is splendidly situated from the point of view of town planning. We are unique in Australia in this respect. Our population is well spread, power is available right round the island, and there are small but very fine towns throughout the State. All are very well established and serviced, and they are capable of tremendous expansion.

We have a perfect climate and assured rainfall, a considerable portion of which falls outside the winter months. In this respect we are similar to New Zealand, Britain and parts of South America. Over the greater part there is a yearly average of 40 inches, and there are no extremes of temperature. The fertility of the land is renowned. Everything that grows in temperate zones abounds. The Topography of our Island is such that from a scenic viewpoint one gets something of everything. It is a paradise for tourists, and as a setting for industry it is, indeed, difficult or impossible to surpass.

And so, looking away back to the early days of Federation and comparing our industrial position then and now, we find that the progress made is little short of amazing. Yet, notwithstanding this, we feel that we are still only in the early stages of the State's industrial expansion. Rapid as our growth has been, particularly during the past 25 years, the next 25 years will certainly see much more rapid and expansive development. Without doubt, Tasmania's industrial future is now assured, and its expansion from now on must be rapid.



Mr. R. J. FOOT,  
President of the Tasmanian Chamber of  
Manufactures.



## Australian Made Machines Shrink Construction Calendar



(By J. M. GOSPER, B.E., A.M.I.E., Aust., Chartered Engineer (Australia), Hon. Secretary, Building Industry Congress of N.S.W., and Director of Development, Tutt Bryant Ltd., Rydalmere, N.S.W.)

**S**PECTACULAR performance and economy have characterised the development, manufacture, and use of construction and heavy earthmoving equipment in Australia. Outside of America it has been claimed that Australia is producing more heavy earth moving machinery than any other country in the world. The use of modern equipment has added greatly to the scope and speed of national construction projects. Machine power is virtually shrinking the calendar in construction work.

**I**N a decade Australians have witnessed spectacular changes in large scale construction methods and in construction machinery. Basic civil engineering is the same mathematical science to-day as at the turn of the century, but new mediums of power have amplified its functions into vastly broadened applications. The pace of progress to-day calls for big-volume production. Large scale construction now is as highly mechanised as is large scale manufacturing. The Construction Revolution will be as important to Australia as was the Industrial Revolution to England.

Due to the impact of the war, the Australian Civil Engineer and the manufacturer of construction equipment obtained the advantage of a "flying start." The threat of invasion demanded the building in rapid time of air strips, strategic roads and other defence projects. There was no time for extensive trials and investigations of new methods and new machines. The close collaboration of the Civil Engineer and the manufacturer in those dark days yielded quick results. The speed at which defence works were completed was incredible compared with pre-war standards.

Wartime construction achievements demonstrated that what once would have been a visionary dream could now be reduced to the relatively simple task of assigning the appropriate robot-like equipment to accomplish the fact. Both the constructor in the post-war period and the manufacturer of construction machines were quick to realise that here were the ideal methods for the rapid development of Australia's untapped resources.

The science of earthmoving in this country grew up overnight. The past five years has seen striking development in equipment design and utilisation. The demand is for larger and more efficient machines so that the cost per ton can be lowered for excavation and earth fill. With a Public Works programme estimated to cost 743 million pounds, emphasis must be placed on construction costs. Machines now being built dwarf those of 1939, and are from two to three times larger than those in operation in the early 1940's. In the construction, for example, of the North-South Road in Central Australia, which was built in record time during 1940, the largest tractor-drawn earth scoop or scraper used had a capacity of only from 6 to 7 tons, and was of American origin. Now machines are being built in Australia with a capacity for excavating 18 tons of materials in the space of 60 seconds. These machines also can

travel at three times the speed of the equipment used on the North-South Road. In keeping with the pace of traffic on to-day's highways, therefore, construction equipment is growing constantly more powerful and efficient. Australian highway design and construction methods have come a long way since Lieutenant William Cox, in 1814, with a crew of 28 men inscribed that epic in the annals of road building by hewing in six months a highway 100 miles long over the forbidding sandstone ranges of the Blue Mountains.

Communication is the life blood of all Commerce. The little Colony at Sydney did not thrive until the road over the Blue Mountains was completed. To-day there are some 500,000 miles of roads in Australia's three million square miles occupied by nearly eight million people, as compared with three million miles of rural highway of all kinds in the United States of America of equivalent area and with a population of 150 millions. In addition, Australia is crisscrossed by 27,200 miles of railways and 28,000 miles of air routes. With its limited population Australia has done magnificent work in highway construction.

So great has been the development of mechanical construction equipment in this country that the Australian manufacturer is now able to claim that he is producing more heavy earth-moving machinery than any other country in the world excepting the United States of America. It has been estimated that America produces nearly two-thirds of the world's machines of all types and has more than half of the wealth of the world.

The Public Works programme at present scheduled will cost more than 743 million pounds. Can it be spent without interference with the projects of private enterprise? Is there sufficient manpower available for these projects? Will sufficient labour be available in country areas? "The machine" will provide the answer to these three questions.

Each machine is equivalent to 2½ men per horse power hour on arduous jobs. For example, a 60 horsepower tractor with a 'dozer' attached, will do each hour the work of 150 men armed with picks and shovels. In other words, the machine and one operator releases 150 men from hard, back-breaking work so that they can be employed at easier, cleaner and more interesting tasks at higher wages.

Machine power, therefore, can be substituted for manpower, particularly at this time, when Australia is in desperate need of increased population to fulfil her destiny. With the aid of mechanical equipment it is possible to increase many times the effective working population in any area. In the building, for example, of the large Glenbawn Dam, near Scone, for flood mitigation and irrigation in the Hunter Valley, N.S.W., earth moving machines operated and serviced by a mere handful of men were doing the work each hour of nearly 21,000 men equipped with picks and shovels.

With machine power much greater quantities of excavation can now be handled at one-third the cost and nearly three times the speed of pre-war methods. Not only has the cost per ton of earth moving been reduced by the use of machinery, but manpower has been provided for other essential work.

It has been demonstrated that modern equipment can clear in 226 machine hours virgin land that formerly required 6,063 man-hours of manual labour, with a cost saving of 76 per cent. New methods of grading, trimming and back sloping show a saving of 94 per cent. in costs. Logging arch equipment attached to tractors now in use by the N.S.W. Forestry Commission, and also by the newsprint organisations of Tasmania, has increased by over 100 per cent. the log loads from the bush to the sawmill, whilst modern



Mr. J. M. GOSPER





methods of handling sawn timber from wharf to timber yard has reduced handling costs by almost 80 per cent. The Commonwealth Government's Experimental Building Station in Sydney has recently tested a machine for digging house foundation piers. The machine reduced the time for digging of a complete house foundation from nearly two weeks to 2½ hours. It is estimated that costs are reduced by almost 80 per cent.

One unusual machine is now doing the work of bulldozing three times as fast as former equipment. The machine can operate backwards and forwards at 15 miles an hour. The machine can also operate with a scraper or scoop, and collect, carry and spread up to 18 tons of material in one operation.

If we are to hold Australia, to maintain the standards of living to which we have been accustomed, rural and industrial development of the Commonwealth must be pushed to the limit. The recent "dollar crisis" has demonstrated how quickly Australia is affected by international events and trade fluctuations.

With their great natural resources, Australians could have almost anything they desired, provided they went to work and produced it, claimed a famous American Industrialist during a recent trip to this country. He said that mechanical equipment now requiring dollars for its import could be made as well and as cheaply as in America once it was established on a mass production assembly line basis. American engineers, he added, could learn something by coming to Australia.

We must open up and exploit our vast natural resources. We must also provide the opportunity and supply the incentive to the migrant of the most desirable type. At the same time we must promote the economic security and stability of our own citizens. There will be no place for timidity if our problems are to be solved.

With the completion of the large Public Works programme now under way, life in the vast inland will change in character. The settler was faced previously with transport costs out of all proportion to other factors. A well planned road system, tied in with well organised air and rail transport service, will do much to develop our rural areas.

Water, however, is the great problem. Unfortunately, Australia lies in one of the dry zones of the world, and its water resources have definite limitations. The average annual rainfall on the mainland of Australia is 16½ inches, compared with 26 inches for all land areas of the world and 29 inches for the United States. The average for Europe is 24-1/3 inches. Rainfall in Australia varies from 178 inches in North Queensland (North Eastern Australia), to less than five inches in Central Australia.

The heavy rainfall in the North is of monsoonal type, and most of it falls during three or four months, the winter being dry. Summed up, only one-third of Australia has an average annual rainfall of 20 inches or more, the remaining two-thirds of the Australian continent averages from 5 to 20 inches. Since nearly 40 per cent. of its area lies within the tropics, evaporation is high. No less than 46 per cent. of the total land mass experiences evaporation more than twice as great as its rainfall.

From 15 to 20 inches is the lowest annual rainfall that will support agriculture without irrigation, and less than 20 inches only when the incidence of the rain is suitable. Even lands with 20 to 28 inches of rainfall, however, could be subjected to disastrous droughts. It is obvious that water conservation in the better watered third of the continent offers not only the main means by which intensive development within it can be supported, but also the only means by which close settlement of even a portion of the less favoured remainder can be achieved. In fact, it has been estimated by some that on present known facts, it is unlikely that the water resources of Australia will be sufficient to irrigate even five million acres, namely only a quarter of one per cent. of Australia's total area. This figure is an amazingly low percentage.

On the other hand, the late Dr. J. J. C. Bradfield, Civil Engineer, of Sydney Harbour Bridge fame, disagreed with this viewpoint. His plan embraced the whole of Western Queensland and the North-east sections of South Australia, and involved the building of suitable dams to impound the flood waters of the inland rivers (Finke, Georgina, Diamantina and Cooper's Creek), which at times carry enormous volumes of water, which is eventually lost in the sand of Central Australia. Dr. Bradfield estimated that by so doing, an inland water surface of 20,000 square miles would be formed for use as irrigation projects and capable of completely altering the climate of the area which it served. Headwaters of several of the East coast rivers would also be conserved under the scheme, and the water so collected, conveyed to the west of the mountain ranges and distributed on the Central plains as irrigation water and domestic and stock supplies. Experience with increased rainfall following the completion of Boulder Dam in the United States certainly lends support for the Bradfield scheme if suitable dam sites can be found. Dr. Bradfield suggested further that under his scheme, Australia should hold a population of 40 millions by the end of the century, and eventually 90 millions.

Dr. Bradfield's proposals, estimated to cost over 40 million

pounds, are so large, and based on such limited data, that any Government would be, indeed, courageous to embark on such a scheme without further detailed and searching investigations. On the other hand, who is to say at this stage that the Bradfield plan is impracticable and fantastic? "Where there is no vision, the people perish."

Some schemes, however, are under way. Some 50 million pounds is to be spent over a period of 15 years in the development of meat producing areas of North Australia and the Northern portion of Western Australia. Over the past 50 years, many schemes have been advanced for the development of the cattle country in this area, but very little has come of them. The huge cost which would be involved has prevented the intensive development of this vast territory which comprises over half a million square miles. Improvement in production and population in this area can only come from irrigation.

The Kimberleys have always been known as the cattle country. The Ord River runs through the area to be developed. This river has its origin in the hilly country north of Halls Creek, some 200 miles south from Wyndham. The catchment extends easterly to well within the Northern Territory, and at a suggested dam site, the catchment area is approximately 18,000 square miles. The dam site selected would provide a storage capacity of two million acre feet, plus a reserve for flood control, and this would command the irrigation of some 200,000 acres. This storage would be the second largest in Australia—nearly double that of the Hume Reservoir and almost three times that of Burrenjack Dam, in New South Wales. Adjacent to the Ord River are the Victoria River, the Fainnes River and other large tributaries which hold promise of being able to be similarly harnessed. The average annual rainfall for this area is about 26 inches.

A condition vital to the consideration of any project for the settlement of the Kimberleys is the practicability of maintenance of a White Australia policy. Informed medical opinion has expressed the view that the area has a very healthy climate, with few endemic diseases. Dengue fever is the commonest, but is not dangerous to life, and usually attacks only newcomers to the district. Infectious diseases common to tropical and temperate climates, namely, measles, scarlet fever, enteric, dysentery, are not seen. Tuberculosis is rare, and other tropical fevers such as typhus, yellow fever, etc., are unknown. Severe African, Indian and Egyptian tropical diseases are absent. It is considered, therefore, that given closer settlement by irrigation the East Kimberleys can be developed successfully by white labour and will ultimately become the home of many generations of healthy and happy Australians.

Other large developmental schemes include the Snowy River power scheme. This river falls 7,000 feet in its 300 miles course to the sea. Before the Snowy water can be used, however, the direction of the river must be changed. It must turn west. When this river is harnessed to serve man, it has been estimated that 1,720,000 kilowatts of hydro-electric power will be generated. This will mean as much to industry as four million tons of black coal per year, which is about one-third of the present annual black coal output of Australia. Hydro-electric power is low cost power, and low cost power is the key to industrial supremacy. In addition to hydro-electric power, the Snowy River Scheme will provide some 1,800,000 acre feet of storage for irrigation purposes in the Murrumbidgee Valley and in the Murray Valley.

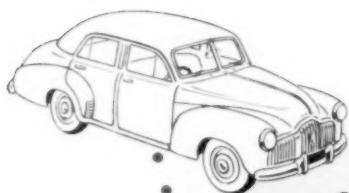
There are also under consideration three major projects in Queensland. These schemes comprise the use of the water of the Burdekin River for irrigation and the generation of electricity, the use of the Barron and Walsh Rivers for irrigation, and the development of railway facilities for the Callide Open Cut Coal Mine. In New South Wales, five major conserving dams are being constructed in the Hunter River Basin. These dams, and associated schemes, will cost about 10 million pounds. The total storage capacity of the dams will be 450,750 acre feet, or more than double that of the proposed new Eildon Reservoir, in Victoria. The importance of these five dams from a flood mitigation point of view is indicated when it is realised that the total soil loss from erosion in the Hunter Valley is in excess of one million cubic yards per annum.

The wealth of a country is created by work efficiently applied. Production spells prosperity; and that is why construction is a stabilising influence and serves as the balance wheel of all industry.

The construction industry is one of the largest industries in the world—if not the largest. It can absorb probably the greatest number of operatives. It covers the production of raw materials, fabrication of articles or units, and their placement in buildings, structures and large construction projects, etc. It cannot be denied, therefore, that construction industry economics play a fundamental part in our national economy. The construction industry creates and fixes a great part of the durable wealth of the world.

Whilst the construction industry is alive and in healthy shape, our political and economic leaders need have no fear of "depressions." We must, therefore, use the construction industry to maintain our national economic stability.





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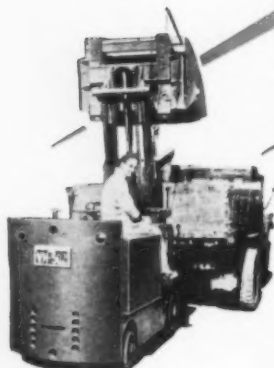


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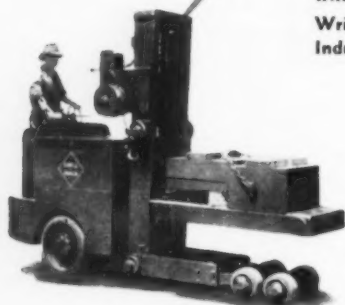
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[Page 96c

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# Shipbuilding

## BIG SOUTH AUSTRALIAN INDUSTRY

(Contributed by the Broken Hill Proprietary Coy. Ltd.)

WORLD wars, with their inevitable destruction of shipping, brings an urgent demand for the building of replacement tonnage, and during World War I, shipbuilding was undertaken in four Australian States. Although the industry languished following the conclusion of the war, a number of the "E" and "D" class vessels built at that time are still in commission on the Australian coast.

World War II, again demanded a vigorous construction of naval craft and freighters, and as a result, yards sprang up around the Australian waterfront. Statesmen and business men alike now declare that shipbuilding has come to stay, that engineers and industrialists have planned their plant on a permanent basis, and that it can now be classed as an established industry.

Nowhere in this vast continent is this more true than at Whyalla, situated on Spencer Gulf, South Australia, where The Broken Hill Proprietary Co. Ltd. laid down a five-berth shipyard approximately ten years ago. For thirty years Whyalla has been the port for shipment of the Iron Knob and Iron Monarch iron ore, raw material for the steel plants at Newcastle and Port Kembla, N.S.W.

THE cheapness of B.H.P. steel has greatly facilitated Australia's industrial development, and it is, therefore, a pleasing and unique feature that the B.H.P. are now building ships at the very base from which the raw material is won to make steel.

Two important factors responsible for the successful establishment of shipbuilding at Whyalla are its favourable climate plus the initiative and adaptability of the Australian workmen to become job-wise—in short, to get the "know-how."

This latter aspect is not limited to manufacture within the yard only, but extends to the numerous outside suppliers of fitting-out equipment. In days of rising costs, builders look to Australian manufacturers to match the increasing demand for their products with low prices.

The outset has been a difficult period, but, with the experience and knowledge gained, and the firmer establishment of outside suppliers of equipment, it is hoped that Australian yards will be able to substantially cut costs.

Many Australians to-day have never witnessed a launching—some still have little idea what the underwater form of a hull looks like. But, with the wide interest shown by even those in no way connected with shipping, all that is passing. Australia is becoming ship-minded, the healthy curiosity of school children at launchings reassures us that we are rearing our shipbuilders of to-morrow.

During the war years the Whyalla yard built four corvettes for the R.A.N., and also two "Chieftain class" vessels, badly needed in the iron ore and steel products trade to replace sinkings from the company's fleet. Since then, five 9,000 ton deadweight "River class" freighters and three 3,000 ton deadweight "D" class freighters have been constructed for the Australian Shipbuilding Board. The yard also has orders from the Australian Shipbuilding Board for four 6,000 ton "B" class freighters, two of which have already been commissioned, whilst the third ship of this class, s.s. "Balook," shown in the adjacent picture, was launched just prior to last Christmas, 1949.

The company is itself building four 12,500 ton deadweight ore steamers, the largest ever built in Australia. These ships will deliver

iron ore from Yampi Sound, W.A., to Newcastle and Kembla, N.S.W., and this ore will supplement and merge with the ore from Iron Monarch, S.A. Two of these carriers, s.s. "Iron Yambi" and s.s. "Iron Kimberley," have already been completed, and are sailing between Whyalla and the Eastern States pending the completion of construction work at Yampi Sound.

The B.H.P. has, in the preliminary stages of design, a 10,000 ton deadweight steamer. They plan to build four of this type to replace the "E" class ships, the vessels referred to in the introduction of this article. The building of these vessels alone represents work for quite a number of years. It is quite feasible that passenger liners and tankers may one day be laid down at this spacious Spencer Gulf yard.

Whyalla has something unique in that both the township and the yard have been laid out according to plan. Mr. Radford, member of the Australian Shipbuilding Board, paid tribute to the builders at the launching of the s.s. "Balook," when he remarked that the Whyalla Yard was the finest up-to-date yard that he had seen.

Like many industrial undertakings to-day, it is not manned to full capacity, having a present labour force of approximately 800, whereas the layout and plant provide for up to 1,800.

There are some interesting features at this yard as noted below:

High (Spring) Tides only occur early morning and evening. Although the majority of launchings have been in the evening, yet the last one was at 7.25 a.m., to take advantage of the good morning tides in December.

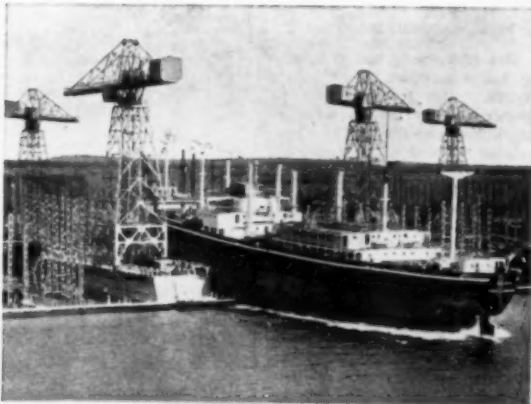
The seaward end of fitting-out wharf is equipped with a 150-ton revolving tower crane.

In the steel stockyard, plates are stored vertically and handled with ease by a four-plate electro-magnet overhead travelling crane. This was specially designed and developed to lift large plates. The magnets are narrow so that they can be nosed in between the plates

(Continued on page 252)



Aerial view of Whyalla Shipyard; also showing blast furnace (left) and fitting-out wharf (right).



Launching of S.S. "Balook" by Mrs. F. W. Radford, wife of member of the Australian Shipbuilding Board. This is the third 6,000-ton freighter being built by the B.H.P. Co. Ltd., Whyalla.



A portion of the main machine shop at the Apac Factory, Finsbury, S.A.

## DEVELOPS MANY NEW PRODUCTS

### APAC INDUSTRIES LIMITED

THE past year has been a particularly satisfying one for Apac Industries Limited. It has resulted in the design, manufacture and marketing of many new products and encouraging progress in the development of others.

The products include "Lemcol" Material Handling Equipment — Lift Jack Systems, Elevating Truck Systems, 2-Ton Trailer Systems, Industrial and Institutional Wheels and Castors, Hand and Platform Trucks and Drum and Barrel Handling Equipment — "Apac" Mechanical and Hydraulic Automotive Jacks and Garage equipment and "Lempac" Steel Balls.

#### NEW BARREL HANDLING TRUCK.

One of the most recent releases is the remarkable "L50" Drum Truck. This truck is sold, together with a simple drum-up-ending attachment that fits into position at the base of the truck and enables the operator to lift drums lying on their side to an upright position ready for transporting to stores, or wherever they are required.

The "L50" is of solid all-steel construction, the designers having well in mind the rugged workaday tasks the truck will be asked to perform. It is fitted with ball-bearing rubber-tyred wheels that contribute to the remarkable ease of handling and smooth running characteristics of this specialised piece of equipment.

The special drum up-ending attachment which is classified as

L52, makes the handling of 44 gallon drums an easy operation.

#### NEW CASTORS MEET DEMAND.

Two more "Lemcol" developments which cater to needs of long standing are the L515 and L516 Institutional Castors. They were designed for use in hospitals and professional premises where absolute quietness is desirable. In action they are vibrationless and feature a positive expanding rubber stem that permits a firm, rigid attachment in tube or pipe legs. They are fitted to a Cadmium plated bracket which revolves on two sets of ball bearings as an assurance of smooth, easy movement.

These Castors are made in two Swivel types. The wheels of both have thread guards that give protection against clogging of threads around the axles.

Further additions to the Lemcol range are the pneumatic tyred casters L550 (Swivel) and L551 (Rigid). These have the same basic characteristics of quiet, vibrationless action, but are designed for industrial use. They are fitted with a 16 in. x 4 tyre and tube, and have a capacity of 1,200 lbs. per set of 4. In being cushion-mounted and vibrationless they (a) protect fragile merchandise from jolts and jars of inter-departmental transport, and (b)

protect factory and warehouse floors from damage.

#### SPECIAL "APAC" AUTOMOTIVE JACKS.

The very low clearance of most of the new model cars created the demand for a service jack capable of achieving both a low starting point and a satisfactory extension. In order to achieve this with a hydraulic jack it was obviously necessary to engineer a twin lift model with 5½ inches as the low height. The extended height of 14½ in. meets all requirements, and, even when fully raised with load, the Jack sits firmly and rigidly on its rather broad base.

The Apac "401" is a hydraulic type Jack and has all the distinct Apac advantages of being fully accessible anywhere in Australia for service or replacement.

Another Apac hydraulic jack that caters to a previously neglected need is the 430. This is a 12-ton Truck Jack, most compact and exceedingly sturdy. Both these jacks are in full production and in the hands of dealers throughout the Commonwealth.

#### STEEL BALLS AS NEW VENTURE.

Every item of Lemcol Material Handling Equipment is now equipped with ground and case-hardened steel balls made on the same premises. These balls are made to "A" grade specifications and the market for them, both at home and abroad, is rapidly increasing.



Portion of Assembly Shop, showing crating of Apac automotive equipment for dispatch to interstate and overseas buyers.



# IN URGENT DEMAND

**WHEREVER THERE'S WORK TO BE DONE!**



*APAC specialises in building equipment designed to magnify man's strength and to minimise and expedite man's efforts.*

*In factories, warehouses, stores and business premises of all kinds there is a*

*constant demand for APAC-built Lemcol Materials*

*such as Lift Jack*



*Systems and Elevating Truck*



*Handling Equipment*

*stock re-location, 2-Ton Trailers*



*for quantity materials handling,*

*Wheels and Casters for specialised*

*mobile equipment,*



*Hand and*



*Platform Trucks and Drum and Barrel*



*trucks and cradles.*

*The APAC name itself is famed in its connection with Hydraulic Car and Truck Jacks,*

*Mechanical and Hydraulic*



*Car and Truck Jacks and giant*

*Bumper Jacks,*

*Garage Jacks.*



*Mechanical*

*APAC also*

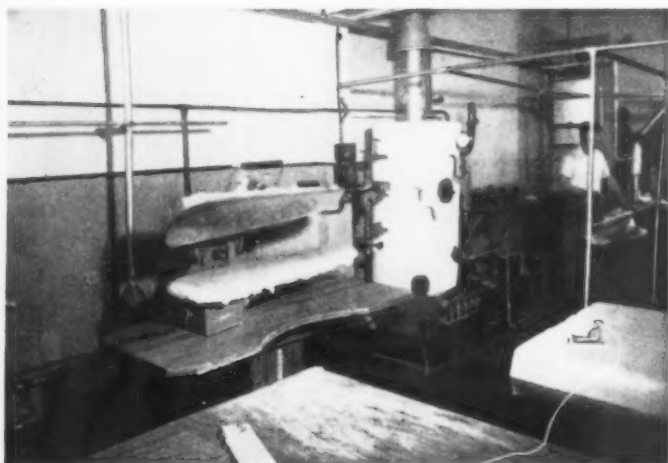
*manufacture "Lempac" Industrial*

*Steel Balls . . . . .*



LA19

**APAC INDUSTRIES LIMITED, FINSBURY, (South Australia)**



(Above) A 5 H.P. Gas-fired Steam Boiler, supplying steam at 75 pounds per sq. in. to two clothes pressing machines, one tumbler dryer, one steam iron and one steam gun. (Right) A Gas-fired Steam Boiler, showing automatic gas control equipment and automatic low water gas cut-out valves.



# Gas-Fired Steam Boilers

## AUTOMATIC CONTROL EQUIPMENT

**G**AS as a fuel for generating steam has such obvious advantages that it has long been used in this capacity. Within the last few years there has been a marked increase in the popularity of gas for this purpose, and many industries have lately switched over to gas for steam raising.

This has been due to three main factors:—(a) The change in construction of the boiler resulting in a higher thermal efficiency; (b) the introduction of full automatic gas control and pump feed equipment; (c) improved eye appeal in the appliance itself.

**T**O the user of steam for heating and processing the inherent benefits of the gas-fired steam boiler are exceptionally attractive. He finds that an automatic supply of steam can be made available, and available at a cost less in many cases than firing with liquid or solid fuels, and in all cases considerably less than electric generation. He finds, too, that a gas-fired steam boiler is very easily installed even in congested city buildings, as the space required in comparison with capacity is very small. The cleanliness and reliability of gas are naturally very important factors also.

The type of gas-fired steam boiler supplied by The Australian Gas Light Company is a standard article built in stock sizes from 1 to 10 h.p., i.e., from 30 to 300 pounds per hour rated evaporation from feed water temperature of 60 degrees F. to steam at 100 pounds per sq. in.

The design is the vertical multi-fire tube type of solid construction, steam pressure actuated automatic gas control and automatic pump feed equipment with low water gas cut out or manually operated injector feed.

It would be very difficult to enumerate the full range of requirements met by this type of gas-fired steam boiler, but the following are some typical examples of processes in which it is used:

**Millinery Trade:** Hat blocking machines, steaming and stiffening pots.

**Clothing Industry:** Pressing machines, steam electric irons, pleating equipment, pressing and shaping knitted goods.

**Dry Cleaning:** Pressing machines, tumbler and room type dryers, cleaning spirit stills, shaping moulds.

**Food Stuffs:** Used in the manufacture of

confectionery, soft drinks, syrups and cordials—in conjunction with bakers' ovens—for steaming and sterilising in butchers' shops—for pasteurising, and bottle washing.

**Plastics:** The moulding of Bakelite and sound records.

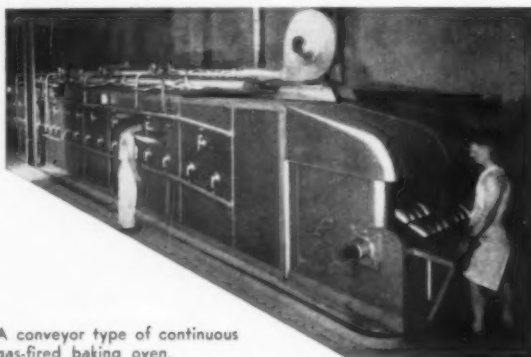
**Rubber Work:** Tyre retreading, tube vulcanising, foundation garments, rubber setting for hair brushes.

This gas steam boiler is fitted with automatic gas control which can be adjusted to operate at any steam pressure from 5 pounds to 100 pounds per sq. in., controlling between the limits of plus or minus 5 pounds per sq. in., of the desired working pressure.

The automatic pump feed unit accomplishes complete elimination of the human element. Condensate is returned from the plant by steam traps to the feed tank which is fitted with a ballcock to control make up

cold water. From the feed tank the water is pumped by a motor driven feed pump automatically controlled by a float switch with mercury tube switches operated by the rise and fall of the water level in the boiler.

A solenoid gas valve is fitted in the gas supply and wired to a mercury tube switch in the float switch. Adjustment is made so that in the event of the water level in the boiler falling below a safe working level the circuit to the solenoid valve is broken and the gas is shut off and remains shut off, regardless of the possible rise in the boiler water level until the operator attends to the trouble. Hence it is impossible to run the boiler dry. A low water level in the boiler means there is no gas to the burner and in the event of a power failure putting the motor driven feed pump out of action the gas supply is automatically shut off.



A conveyor type of continuous gas-fired baking oven.





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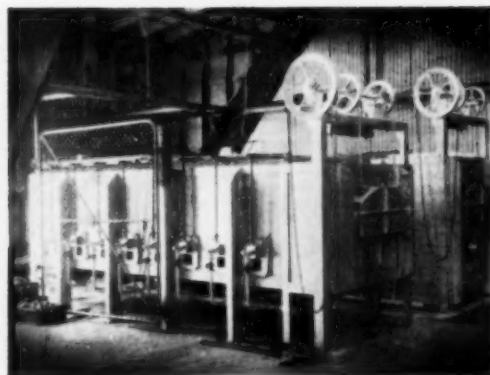
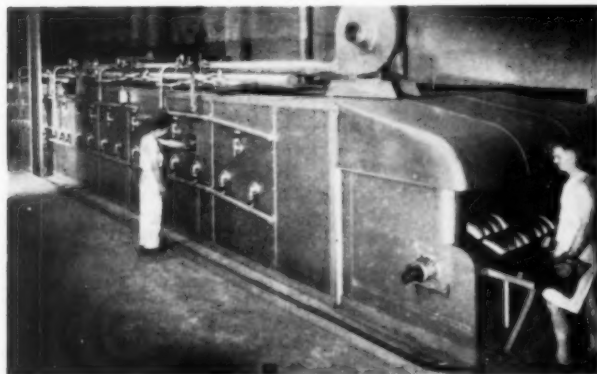
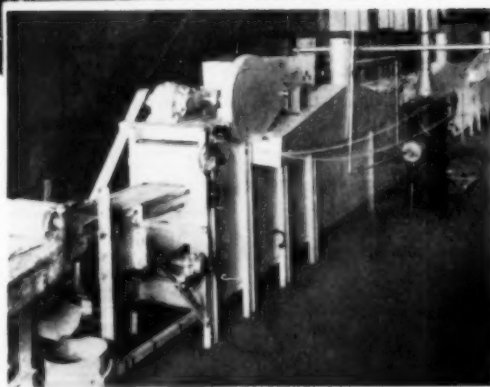
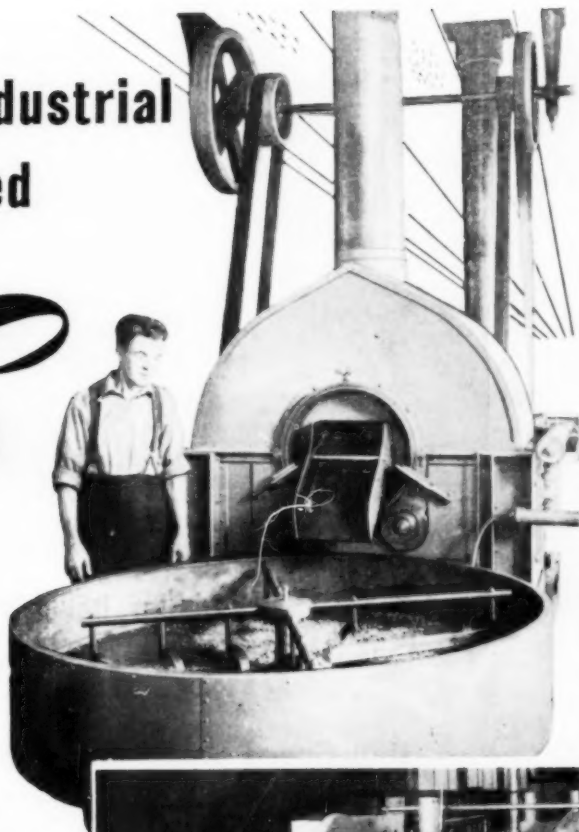
# GAS

In thousands of industrial heating processes—large and small, continuous and intermittent—gas has proved itself the ideal fuel. Gas is clean, speedy, economical, and particularly easy to operate...so flexible that it can be applied to practically any heat treatment job.

If you have not investigated modern gas fired equipment recently, you are invited to contact our Industrial Heating Engineers for information and recommendations . . . Just 'phone M6503, Extension 268.

**THE AUSTRALIAN GAS LIGHT COMPANY**

Industrial Gas Division, Haymarket, Sydney





Aerial photograph shows extensive premises of British Tube Mills (Aust.) Pty. Ltd., at Kilburn, S.A., on the fringe of Adelaide's northern suburbs.

## NEW DEVELOPMENTS AT BRITISH TUBE MILLS

### High-Speed Drawbench a Feature of B.T.M. Progress

**I**N a recent report showing current activities in all departments, British Tube Mills (Aust.) Pty. Ltd. indicate a healthy increase in their present and potential output.

The most positive forward step, from a production viewpoint, has been made in the Drawmill. Here, an entirely locally built High Speed Draw Bench has been installed.

The new Draw Bench was designed entirely by B.T.M. Engineers. It incorporates the best features of latest English and American practice, as well as those developed from local conditions and requirements.

It is capable of cold drawing two tubes at a time at very high speeds—particularly in the medium tube size range—and is thought to be the first bench of its type in the world.

The importance of this installation, and the role it will play in Australia's industrial development, may be gauged from the fact that B.T.M.'s present Steel Tube output is four times greater than was forecast when the Company commenced production ten years ago. Indications are that this demand will continue, and that only by constantly enlarging their facilities can B.T.M. maintain a margin for potential over actual production.

#### STEEL TUBES FOR "HOLDEN" CAR.

All departments at B.T.M. are making their contribution to the Australian Automotive Industry.

In the Manipulation Department a recently installed High Speed Hydraulic Bending Machine is engaged on multiplane bending of components for the Holden car.

The "Tinaloy" Hot Dipping Plant is processing large quantities of small diameter steel tubes for the brake, fuel and oil lines of this car.

The "Tinaloy" Hot Dipping Plant, which is also a new installation, is capable of producing a highly corrosion-resistant surface to tubular items at a remarkably low cost—consequently its future services will be greatly sought after.

#### NON-TUBULAR BICYCLE COMPONENTS.

A further extension of the Com-

pany's activities is noted in the Cycle Fittings Factory, where non-tubular bicycle components are shortly to be produced in quantity. These components include: Chain Wheels, Cranks, Bottom Bracket Axles, Cup and Lockrings, Head Bearing Cups and Lockrings.

The high quality of these components mark them as worthy additions to the bicycle frame and handlebar tubing produced by B.T.M. in the early years of the Company's activities. It will be remembered that bicycle rims were the first departure from tubular components.

These smaller components are completely finished on the premises and a continuous Bright Nickel and Chromium Plating Plant is in full production. Vacuum Cleaner components, Pram Handles, etc., are also handled by this plant.

#### NEW FIRST AID STATION.

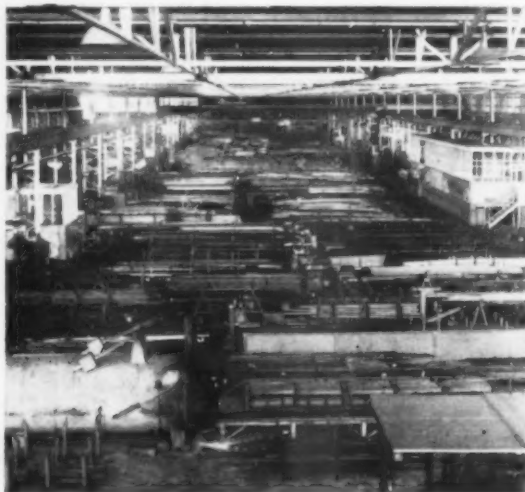
Always well to the fore in providing amenities and safety devices for employees, B.T.M. has recently augmented its facilities with a fully equipped First Aid and Rest Room. The room is extremely modern and designed for the particular needs of the factory. It includes a well-appointed room for emergencies. A doctor is in attendance for a period each day to advise on treatment of injuries and is on call day or night for serious accidents.

#### EXCHANGE OF PERSONNEL.

Of particular merit is a scheme which provides for the exchange of technical personnel between B.T.M. and its English Associates. The exchanges are for a period of approximately twelve months and enable personnel, who perhaps would otherwise not be in a position to undertake such a venture, to travel overseas for experience.

Overseas visits by Executives have also been proved worthwhile, and at the time of writing there are two Sales Executives and two Technical Executives overseas keeping abreast of all developments.

Broadly, it has been a successful year at B.T.M., with experience gained and plans formulated to continue to serve all users of Precision Steel Tubes throughout the Commonwealth.



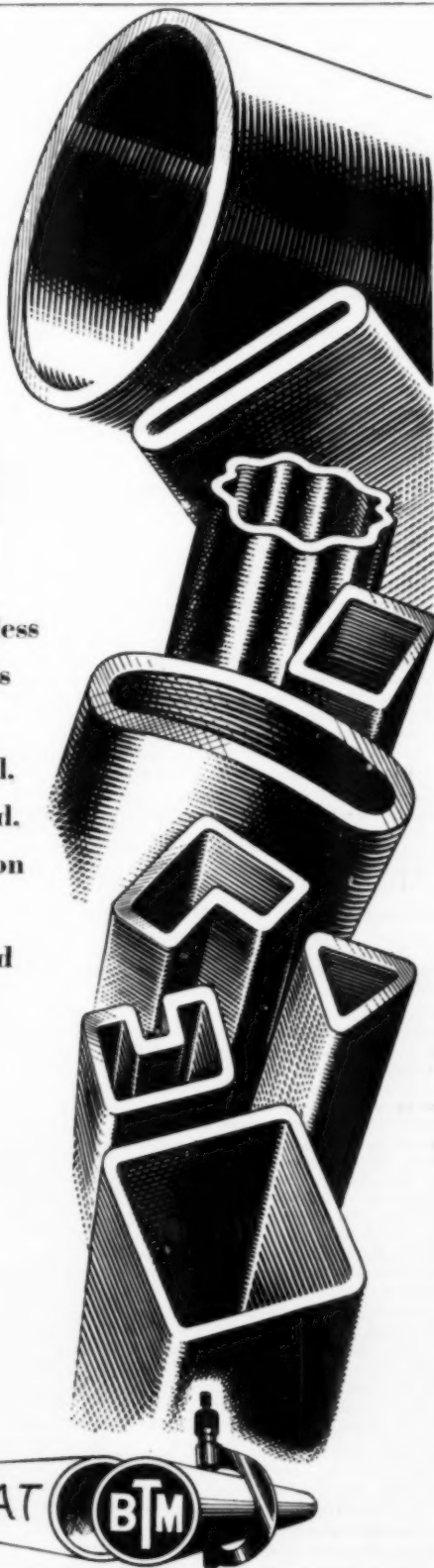
Interior view of mills showing storage racks and test benches.



# We've squared the circle!

The Cold Drawn Precision Seamless Steel Tube in its simplest form is circular. But square tubes are often in demand — so, too, are oval, streamlined, kidney-shaped, D-shaped, fluted and so on. In fact, Precision Steel Tubes in *any* shape for any specific purpose can be produced at British Tube Mills (Aust.) Pty. Ltd., Kilburn, South Australia.

● Available from  
our usual tubing  
stockists in all  
States . . .



IT STARTED AT

BTM

BR 15



## Working for Industry



### C.S.I.R.O. INFORMATION SERVICE

[By C. M. Gray, O.B.E., M.Sc., A.M.I.E. (Aust.), Officer-in-Charge]

INDUSTRY is dependent upon scientific research to an ever increasing degree for the attainment of high standards of efficiency, and scientists and industrialists in all progressive countries are giving much thought to the problem of how best to bring about the necessary degree of co-operation between those engaged in research and those who could profit by application of the knowledge won. Sir Edward Appleton, until recently Secretary of the Department of Scientific and Industrial Research in Great Britain, wrote "Leaders in all walks of life have recently been emphatic in saying that the use of science in industry is essential for the survival of this country."

THERE are major industrial groups which spend millions of pounds per annum on research, and it is only necessary to look over the trade literature distributed by I.C.I. or Du Pont, for example, to gain some idea of their spectacular achievements. If research on this scale is profitable, it is also extremely costly, and few organisations in the world have the financial sinews to sustain research on this titanic scale. Generally speaking, these great enterprises have risen as the direct result of their research activity, and to this extent they can be regarded as being in a group apart from industry generally. They represent industrialised science rather than industry assisted by research.

The bulk of our modern industries had their origin in the arts and crafts which flourished long before the era of systematic research for industrial improvement. Nevertheless, the history of the Industrial Revolution in England is full of instances showing that industrialists were quick to profit by the growth of knowledge won by the research workers of the day, who were, incidentally, quite often leading industrialists themselves. Although it would not by any means be correct to say that progress from that stage was steadily in the direction of closer co-operation between science and industry, nevertheless, it is now by no means unusual to find laboratories serving even moderately sized enterprises. Usually these laboratories are concerned in the main with product control, but quite frequently some developmental research is undertaken as well.

But research, even on a small scale, is still relatively costly, and it follows that there are many concerns which are precluded from having their own laboratories simply because their scale of operations cannot possibly carry the load. It has been estimated that about 70 per cent. of Australia's secondary industry is in this category. How can this 70 per cent. be assisted?

There are several ways. It might be possible to join or form a research association, or to obtain the services of a consultant, for instance. Then again the main purpose of this article is to draw attention to the assistance which is available from the C.S.I.R.O. Information Service.

Doubtless the best course of all is for those engaged in the same trade to form a research association, to the support of which they all contribute, sharing alike in the exploitation of the discoveries of the jointly maintained laboratory and in the facilities of the specialised information service which is usually set up. This scheme is highly favoured by those who have most closely studied the problem of securing the best scientific service for industry. In Great Britain at the present time there are thirty-eight trade research associations. In Australia there are signs of a growing appreciation of the advantages of this solution. Already research associations covering the subjects of leather, coal and coal gas, baking, sugar and sugar-cane cultivation have been formed here. The Commonwealth Scientific and Industrial Research Organisation, set up primarily to promote Australian industry by scientific research and investigation, has the important function of fostering the establishment of research associations.

To assist in making the vast accumulation of information and experience resulting from the research activities of the world accessible to all interested, C.S.I.R.O. has set up the Information Service, a unit specially organised and staffed for this express purpose. In brief, the function of the Information Service, so far as industry is concerned, is to put the man with a problem on the right track to find the best practicable solution. This service is absolutely free.

Just eight years ago, a review of the activities of this Service—then known as the Information Section of C.S.I.R.—was published in this Annual. Since then, Information Service has expanded and broadened its scope, but its prime role is unchanged.

Nearly 4,000 scientific and technical enquiries a year, coming from all over Australia as well as from overseas, are being handled by Information Service. It is staffed by scientifically trained officers, with practical experience in research or industry. It draws also upon the wide range of specialised scientific and technical know-

ledge within C.S.I.R.O. itself, and has built up its own panel of expert contacts in other Government Departments, Universities and private industry. If local resources prove inadequate, the Scientific Liaison Officers in London and Washington are called on for assistance.

Extensive use is made of the vast stores of recorded data to be found in scientific and technical literature. The C.S.I.R.O. group of libraries, considered as a unit, is in itself probably the largest scientific collection in Australia. Outside specialised libraries are also consulted when necessary. In addition, a steady stream of unpublished information and trade literature (often the best source of information on individual products) reaches the Service from the overseas liaison offices, and is also applied in answering enquiries.

During the past few years the main demand on Information Service has been for assistance in the solution of practical technical problems rather than for straight out bibliographical research, such as can be undertaken by any modern well-equipped library. Use of scientific and technical literature, of course, is and will remain an essential part of the technique of the Service, and many enquiries demand no more than a direction to suitable reading. Enquiries with practical problems, however, frequently do not wait, or cannot use, straight out literature references. Many have already tried public libraries and other institutions without success. The best attack in such cases is a personal interview with the enquirer, wherever this is possible, so that the information officer can define the problem, discuss ways and means in comprehensible terms, and decide on the best course of action to arrive at a workable solution.

Certain classes of enquiries, e.g., medical and legal problems, are not accepted, but are referred elsewhere at once. Moreover, there are some types of problem—such as those which will involve lengthy laboratory investigations, or the full-time services of a consulting engineer or chemist on the spot—in which the Service gives only preliminary guidance.

In its service to industry, C.S.I.R.O. Information Service is closely associated with the Defence Research Laboratories Technical Information Section and the Division of Industrial Development. Regular meetings of the "Industrial Information Advisory Committee" ensure close collaboration between these three Government advisory services. These meetings and consequent close co-operation have been found invaluable in preventing duplication of effort, and in ensuring that the best use is made of local sources of information.

Apart from its direct dealings with the public as a technical advisory service, Information Service keeps closely in touch with research work proceedings within C.S.I.R.O. itself—no easy matter in such a widespread organisation. This is essential, for it is emphasised that the aim of the Service is not necessarily to furnish the solution itself, but to procure the best solution. With the increasing degree of specialisation in research fields a remarkable range of individual skills is available to be brought to bear. Again, some units of C.S.I.R.O. maintain their own specialised information sections, and Information Service normally directs all relevant enquiries to the unit concerned.

Information Service is able to keep itself up to date, not only on the work of C.S.I.R.O., but on current Australian research and industrial trends generally, by its technical abstracting activities. Over one hundred Australian scientific and technical periodicals as well as a number of annual reports and various odd publications, are regularly seen and abstracted, the abstracts being published as a monthly supplement to the Journal and Proceedings of the Royal Australian Chemical Institute, under the name of "Australian Chemical Abstracts." Only work of chemical and metallurgical interest is covered at present, but it is hoped to extend the service eventually to material in all branches of science and technology. Possibly Information Service will eventually become the indexing and abstracting service for all research work published within the Commonwealth.

(Turn to page 255)





# THE SCIENCE OF ELECTROPLATING

## ITS RELATION TO AUSTRALIAN PRODUCTION

By K. Leigh, President of the Melbourne (Australia) Branch of the American Electroplaters' Society.

THE number of electroplated articles handled by the average person in the course of a day would, if recognised, probably surprise him, and may be confirmed by a glance around any office, kitchen or bathroom. Besides the ordinary every day articles, such items as automobile fittings, surgical instruments, jewellery, etc., must also be taken into consideration. Electroplated finishes are becoming standard on an increasing number of parts, fittings and articles, the full extent of their application being little realised in current times when so much is taken for granted.

The craft of plating has always been somewhat of a mystery to the layman and, indeed, not so long ago it was very much of a mystery to the plater himself, solution formulae and working techniques being regarded by those with the "know how" as warranting close secrecy. While there is still considerable room for art in plating, there is now a lot more science; reliable instructions being available from many sources.

AUSTRALIA'S plating plants may be broadly classified into two types. Firstly, there is the large number of relatively small independent plating firms working on a "jobbing" basis who, perhaps, do the greater proportion of the work, and, secondly, the larger plants attached to certain big manufacturing firms who desire the finishing of their products to be done on the spot. Both have contributed much to the local advancement of the science. The former, perhaps because of the diversity of articles and widely varying shapes encountered, has to explore many ways and means of effecting a satisfactory finish, while the latter, due to the fact that large quantities of identical parts are to be processed, generally concentrate on high efficiency being obtained during the plating process.

Those engaged in the Plating Trade are kept informed of latest developments through Branches of the American Electroplaters' Society in Adelaide, Sydney and Melbourne. These Branches, with a total membership approximating 300, bring the latest information from overseas sources to their members, conduct monthly lecture programmes on the Science of Electroplating, arrange plant visitations, and provide opportunities for platers to discuss their problems and compare notes on various experiences. These meetings, together with social events run by the Branches have developed an excellent spirit of friendship between Australian platers.

Technical training of personnel to operate plants is catered for by Technical Schools and Colleges, Electroplating having recently been gazetted as an "apprenticeship trade."

Australian platers received their first large scale experience of plating to specifications during the war, and many of them will not easily forget specifications such as CL 1001B, which deals with tropic proofing of service materials. Under the extremely severe conditions of tropic exposure encountered in the Pacific Zone, electroplating was found to be superior to other metal finishes. An ever increasing amount of peacetime plating is now carried out to specifications drawn up or endorsed by the Standards Association of Australia.

Whilst technical advances in electroplating practice originate for the most part from overseas, this country is now beginning to participate in actual research work. For some time, a small but valuable amount of research work has been done by the larger manufacturing firms and, perhaps to a lesser degree, by "jobbing" platers. In addition, the recent war made necessary the establishment of Government sponsored research at the Defence Research Laboratories. These Laboratories, situated at Maribyrnong, Victoria, with Branches at Adelaide and Sydney, have a well equipped electro-deposition section primarily established for the conducting of re-

search and to look after the technical requirements of Government factories and the Armed Services, but now having available part of its capacity for advisory and testing work for the benefit of the Industry as a whole. In addition, the Laboratories have recently commenced to issue a small two-monthly publication entitled "Plating Notes," which gives latest information on subjects of interest to the Trade.

The type of work being done and the methods employed in Australian plants have undergone big changes in recent years. During the war, decorative plating was set aside to a large extent, and the Trade, besides providing the well-known zinc and cadmium surfaces on large quantities of service equipment, was called upon to carry out a considerable amount of hard chromium plating on machine parts, tools, dies, etc., both for salvage and wear resisting purposes. The demand for this type of plating decreased to a large extent when the war ended, but an important fraction is still being done by certain firms who have specialised in this type of plating. A number of organisations, realising the remarkable advantages to be gained by the use of hard chromium to wearing surfaces, have set up their own plants for this purpose, while the large aircraft firms have actually had to undertake a number of specialised plating operations for engine maintenance, such as the production of silver/lead/indium aircraft bearings by electro-deposition.

A very large proportion of the work done in Australian plants consists of the plating of automobile parts for both decorative and pro-

TECTIVE purposes. In addition to the plating of components manufactured locally, piece parts imported from overseas in an unfinished condition are processed here before assembly.

Many of the latest techniques in connection with electroplating are finding increasing application to Australian practice. Perhaps the most notable achievement has been the introduction of the modern organic type of bright nickel solution into a large number of plants. Use of this process enables a bright finish to be obtained on dull surfaces without recourse to the usual buffing, thereby reducing the labour involved in the latter process.

Other developments include high speed copper plating baths, particularly useful as time-savers in the plating of zinc base die castings where thick copper undercoats are called for; similarly, the nickel plating operation is being speeded up by the introduction of solutions such as the high chloride nickel bath.

A novel idea, recently introduced, is also finding favour. This process involves the use of periodic reverse current plating which by an intermittent electro-smoothing operation during plating enables a much higher plating current to be used, thereby giving a smoother finish in a shorter time. A number of electronic timers which automatically reverse the current are now on the market, these being of local manufacture.

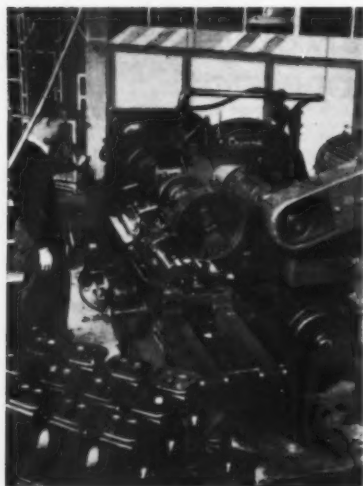
Overseas developments in the field of automatic plating plants are being incorporated in Australian practice where it is warranted by the type and quantity of production. The parts to be plated are loaded on to a continuously moving chain and are conveyed at a slow speed through cleaning, acid dipping, rinsing and plating tanks whose lengths are adjusted so that the parts receive the correct time of immersion in each tank. It will be appreciated that such a process demands that very strict control of the solutions and current density be maintained, a condition that would have been very difficult to obtain a few years ago.

Advances in the science of electroplating have not been confined to the actual process of electro-deposition, many new developments in connection with the processing of the work before plating having been effected. As an illustration, the "Backstand Idler" can be quoted. This equipment—which consists of a stand mounting an idle pulley set back a few feet from the polishing lathe to carry an endless belt coated with an abrasive, polishing being done on the belt where it runs over a specially compounded wheel set on the lathe—has, in a large number of cases, greatly speeded up the polishing operation which is very often the worst "bottleneck" in the standard bright chromium process. Use of this equipment also obviates the need for re-surfacing the felt wheels or stitched mops otherwise used for this operation.

(Continued on page 278)



Mr. K. LEIGH,  
President, American Electroplaters' Society,  
Melbourne (Australia) Branch.



A British "Churchill" centre-grinder used for "superfinishing" compressor pistons.



The Taylor-Hobson Electrolimit gauge checks master gauges to millionths of an inch.

## NEW TECHNIQUES IN REFRIGERATION ENGINEERING

### SEALED UNITS REVOLUTIONISE THE INDUSTRY

THE manufacturer of household appliances has always had one important factor to bear in mind; and that is the average housewife isn't mechanically minded, and the less complicated an appliance, the less it requires skill or care in operation or in maintenance, the more acceptable it will be to the user.

This factor was naturally recognised by Kelvinator from the earliest days of household electric refrigeration, and the problem exercised the minds of its most competent engineers right from the birth of the industry.

The ideal was, of course, the unit which required no attention by the user—the "fit and forget" ideal common to most appliance manufacturers.

In refrigeration, this ideal resolved itself into the sealed unit which would not only require no attention, but would actually be proof against tinkering by amateur adjusters. Almost 20 years ago Kelvinator began research and experiment in the direction of producing a truly hermetically sealed unit. The objective was to enclose the compressor and motor inside a welded housing which could not be dismantled except by torch cutting. The difficulties to be faced were obvious. Minor faults, easily repairable in open units, had to be eliminated in advance. If, as was anticipated, there could be no provision for replacing (as can be done easily in open units), worn big and little end bearings, crankshaft bearings, pistons, or other parts subject to friction, then friction wear had to be reduced to mechanical zero. Anything less would require, under the Kelvinator protection plan, the replacement of the entire unit—a costly procedure if faults, even minor faults, were to occur with any degree of frequency.

In spite of all difficulties, the Kelvinator Sealed Unit is to-day an accomplished fact;

but the accomplishment has well-nigh revolutionised the whole process of refrigeration engineering.

The first essential was to acquire a metal which would cast accurately to a predetermined hardness, while providing the close grain required for machining to extremely fine mechanical tolerances. This metal was found in Meehanite, an iron-steel alloy which has been described as "representing the most advanced development in the metallurgy and manufacture of cast iron to precise physical

properties." Meehanite bridges the gap between iron and steel, merging the fatigue resistance of the former with the resilience and machineability of the latter. Meehanite casting required foundry additions and enlargements which have made the highly mechanised Kelvinator foundry one of the most modern in Australia. Meehanite is just about the most controllable of casting metals, and the hardness of the finished castings can be predetermined very accurately. Nevertheless, Kelvinator take no chances, and a sample wedge from every melt is examined to see that it is as specified for the job on hand.

The machining of castings to the final tolerances required involves at Kelvinator the use of some of the most remarkable precision machinery in Australia. The accuracy of the tools themselves is, of course, of vital importance. Typical of the Kelvinator tool-making machines is the Hauser jig-borer—an instrument so precise that it is necessarily housed in an air-filtered, pressurised room to prevent atmospheric dust from affecting its microscopic accuracy.

The final machining of sealed unit parts employs a wide variety of the latest centreless grinders, boring and honing machines, and every part is checked and re-checked on high fidelity electric and air gauging equipment; the master gauges used in checking are themselves checked for accuracy on electronic devices that register variations of a millionth of an inch.

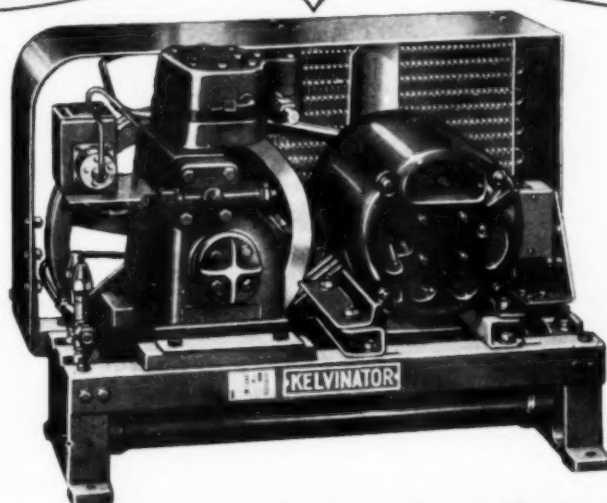
In actual assembly, each unit is built up from matched parts, even though standardisation has been achieved to, in some cases, 2/10,000 of an inch. Assembled units undergo exhaustive bench tests before they are finally sealed into their housing where, permanently submerged in oil, and completely protected from dust and moisture, they begin their life's work of providing dependable, fool-proof refrigeration for Australian housewives.



This Swiss-built "Hauser" jig-cutter is one of the most exact precision machines in modern industry.



## "KELVINATOR EQUIPPED"

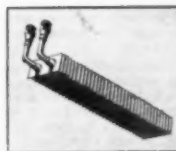


*for Prestige, Dependability, Peak Performance*

The whole field of **commercial refrigeration**, from small shop equipment to the requirements of the largest user is adequately covered by Kelvinator—Australia's largest producers of refrigeration equipment. Kelvinator compressors, both air and water cooled, provide the dependable key-piece to any installation, and the vast range of complementary equipment provides the right answer—in size, capacity, dependability and economy—to any and every requirement.



**UNIT COOLERS**  
Range covers all needs from small cabinets to cold-rooms.



**FINNED COILS**  
Continuous tube, rapid cooling in a wide range of size and shape.



**FLOODED TYPE IMMERSION COILS**  
Factory tested and proved for use with any type of brine system.



**ICE BLOCK MAKERS**  
In a wide range of sizes, for incorporation in existing cabinets.

*GO RIGHT AHEAD  
WITH DEPENDABLE*

# KELVINATOR

★ Kelvinator commercial refrigeration specialists will be pleased to recommend the equipment which will give the most dependable, most economical service for any purpose.

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KELVINATOR AUSTRALIA LIMITED • ADELAIDE, MELBOURNE, SYDNEY

KR19



# FAN ENGINEERING

## A Notable Aid to Australian Industry

[By George G. Vincent, M.I.H.V.E., of Vincent Ventilating and Air Conditioning Co., Newcastle.]

TO provide comfortable indoor weather conditions is ONE of the aims of Air Conditioning. Another is to adjust the mixture of air and water vapour that constitutes our atmosphere. Now, air and vapour are ingredients of all manufactured goods, and air conditioning blends these two ingredients, so that all properties of the finished goods are to the standard required. Fans are required to deliver this air mixture after fans have been used in the process of restoring moisture—humidification or removing moisture, de-humidification. Manufacturers must clean and rebalance air, raw air is not good enough, it is merely another raw material.

It is now 25 years since I first sought for and brought to Australia the services of overseas air conditioning engineers to assist our industries on behalf of my father, the late George Vincent, M.I.H.V.E., who thought I was hitching my wagon to a star, and counselled caution. Since 1900 he had successfully pioneered central heating systems and fan engineering systems, and after that the Australian manufacture of fans and blowers, and finally in logical sequence, as in all other countries, he introduced air conditioning systems.

Air conditioning provides not only for temperature control and air cleaning, but for the climate changing feature of humidity reduction produced through the use of chilled water.

When Mr. A. R. Morris, the General Manager of Carrier Air Conditioning Ltd., wrote for this Annual last year, he entitled his remarks "Air Conditioning—Whither?" His survey of Australian air conditioning practice was most satisfying, and he concluded that, so far as the present scene was concerned, "there is ample evidence for extreme optimism for the future, nothing can prevent the ultimate realisation of this. Intelligent co-operation from industry generally can materially assist."

THE Prime Minister, the Right Honourable R. G. Menzies, in his first broadcast address to the nation, said that "higher production is our business." His full statement was: "Arresting the prices rise will require leadership and close co-operation. It will require the higher understanding of all that higher production is our business and that the more efficiently we produce the more our money will buy, and the higher will be our real standard of living."

Our manufacturing conditions were carefully analysed in the December 24th issue of the "Australian Manufacturer," and concluded: "These figures prove three facts of fundamental importance. First, that the average weekly male rate of pay is higher in Australia than in Britain. Second, that the increase in hourly earnings in Australia during the last decade is higher than that in Britain, in the U.S.A. and in Canada; and third, that the actual average weekly hours of work in Australia are lower than those of Britain and Canada, being higher than those of the United States by a small margin."

The Attorney-General of Great Britain, Sir Hartley Shawcross, also said last week that by the proper use of labour, output could be increased by 25 per cent. without additional machinery. Sir Stafford Cripps has since reported that an increase of from 6-8 per cent. had already been achieved.

Our wages cost position is, therefore, against us. Can we also raise production without additional machinery, and by what percentage? Apparently we must try, if we are to meet our rising costs of production and continue the present wage structure.

To work in a factory is no longer a slur on one's social position. To wear overalls is not a badge of servitude. To wear a uniform in wartime is an honour. Factory morale can be raised by improving the conditions of working to that of the white collar workers.

How are we to obtain this higher production? We will assume that factory organisation is good, and the supply of materials is adequate, that the number of workers is sufficient, and that man-

agement is competent and wise. Then, what of the operative? If he is fully trained, strong enough and healthy enough for the task involved, and is not overworked, then what more can we do in these precious forty working hours per week to obtain this step-up in production? It is clear that we must improve the working atmosphere of the factory, so that each man is doing his best. But there is another working atmosphere to consider, what of that? What of the surrounding air? Is it highly humid? Has it a sickening odour? Is there free steam or floating dust, or avoidable noise? Is the ventilation by draught?

Enlightened managements provide ample means for overcoming these so-called industrial conditions. Believing that the productive efficiency of employees is of supreme importance, they avail themselves freely of the services of the ventilation and heating industry, and they can achieve the following results:—

**IN THE FOUNDRY.** The constant and unflinching reduction of high dust concentration, so that the air around the rammers, pedestal and portable grinders is clear as outdoor air by the instantaneous removal of all dusts thrown off, and where necessary the supply of outdoor air filtered and cooled. The cleaning of all moulding boxes by vacuum and the continuous exhaust ventilation of breaking down frames, swing grinders, and at all points where dust rises throughout the foundry.

**FOR WELDING BAYS.** Continuous removal of welding smoke with flexible connections to each working head. Exhaust ventilation generally from the department with underground ducts to near floor outlets, and with outdoor air introduced through jet fans where possible.

**FOR FORGE SHOPS.** Full smoke control secured by down draught hoods connected to underground ducts, and with replacement air provided from outdoors by the use of jet fans with adjustable nozzles.

**FOR RUBBER MILLS.** Copious volumes of air exhausted from every rubber mill through exhaust pipes of ample size, connecting to hoods of liberal dimensions. The removal of all rubber dust from buffing operations through well designed hoods connected to flexible piping.

**FOR TIMBER WORKING.** Every machine to be equipped with exhaust hoods however difficult it may seem to be to construct them, with oversize exhaust branches to large size main ducts leading to oversize exhaust fans, and oversize dust collectors. This oversizing is essential, so that the adding of one or two extra machines does not throw the exhaust system into lower suction efficiency. Every wood-working shop to be so fitted with efficient exhaust systems and kept in first-class repair always. If the dust concentration still remains high, then supplementary fresh air supply systems or fans to be also installed.

**FOR TEXTILES.** The textile industry requires fan engineering equipment in every department, and the high regard of the management to air conditioning problems is axiomatic. But what of the floating dust? And the heat generated by the machines, and the heat of low ceiling bays? The workers can be made more comfortable and many health hazards can be removed.

**SHIPPING.** Cooling provisions for engine rooms and ventilation and heating of crews' quarters are installed with every new ship, but there are some vessels when the sea folk are without these amenities, but their number is decreasing, and sailors are happier folk, and there is less sickness and off duty periods in these ventilated vessels.

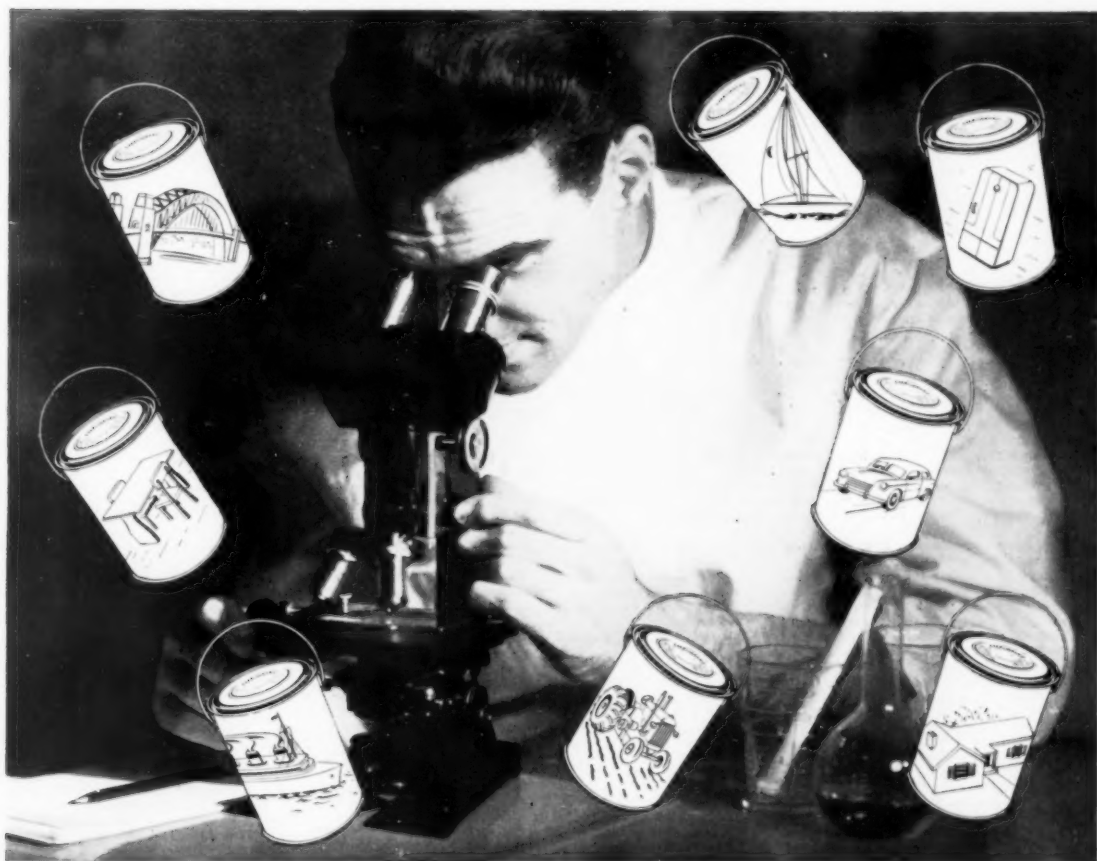
**FELTING INDUSTRY.** Much water and steam bring high humidity and on summer days workers become slack with the fatigue of tropical conditions. This applies to public laundries, paper mills and dye houses and abattoirs, and the leather industry. Buildings so treated show that men can keep stronger and sickness is reduced, for steam can be absorbed in warmed air, moisture can be removed, visibility improved in winter.

(Turn to page 110)



Mr. GEORGE G. VINCENT





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It is an accepted principle to-day that most things manufactured or built must be protected to ensure their durability.

From the tiny speck needed on the eye of a child's toy to the tons and tons of paint on a bridge or a ship, this principle holds good—"Make it first, then protect it."

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That is why paint research by B.A.L.M. and Associates is so important . . . that is why it must perforce keep ahead of the needs of the community and be ready to offer the best solution to every new problem of protection.



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**STEAM GENERATION AND SMOKE CONTROL.** Grit arrestors, Multicone dust collectors and precipitators are all available in Australian manufacture, and smoke can be abolished or reduced to an imperceptible extent. Jet fans and patented air delivery nozzles can be provided in the power houses, so that attendants can be kept alert and comfortable, and the fatigue point averted, and cooled air supplied in the areas in which these men are stationed.

**COAL DUST.** Special consideration is being given this year to this subject at the first International Labour Office conference in Sydney, when industrial hazards caused by dust will be closely examined. "While we have already made great steps in preventing dust in Australian mines," said Dr. W. E. George, the Chief Medical Officer of the Joint Coal Board, "the conference would do a lot to make managements more dust conscious." He added that though the conference was meeting primarily to consider the coal dust menace, it is desirable to state that the conference would not be restricted in its discussion to the effect of dust in the coal industry—alone. It is encouraging to know that Australian industry as a whole will have the benefit of the conference of these medical experts and the specialist delegates from 46 nations. An expected attendance of 100 special workers in this field of scientific enquiry augurs well for the success of the conference.

**COAL MINING AND TUNNEL VENTILATION.** The days are gone when these operations brought distress to underground workers. A new age is dawning and adequate ventilation is being secured in all mines, and the old inadequate surface fans are being removed, and fans of the requisite volume for the increased development of the mines are being installed, as well as auxiliary booster fans being provided in the workings wherever required, due to the reduction in the air velocity in areas not adequately served by the surface fan. Tunnelling operations are carried out with lengthening air ducts as the work proceeds with forced draught fans to bring in large volumes of outdoor air.

Mechanical ventilation is a perpetual aid to all these industries, and the ventilating industry can furnish this equipment selected with full knowledge based on long experience, so that results can be anticipated, and if necessary guaranteed, to meet every condition that needs improvement to gain higher production and yet conserve the health and strength of all workers and control staffs.

Industrial diseases can be abolished and the fan industry plays the leading part, and is the greatest of all the remedial aids.

#### HOME AIR CONDITIONING.

The American industrialist, Le Tourneau, in his final message before leaving Australia, said that if Australians worked harder they could all have air conditioned homes. It was a happy suggestion that we all might be living in air conditioned homes, and thousands of men will have dwelt upon the pleasant prospect of entering their homes to find there the stimulating coolness and mountain-air quality that they have already learned to expect when travelling in the air-conditioned trains of New South Wales and Victoria, or in Solent or Argonaut Flying Boats.

But home air conditioning begins with the construction of the house. Our architects can make a great contribution here employing structural insulation to the fullest extent.

To achieve an air conditioned home is, therefore, the result of effective combination between both the architect and the engineer, so that the areas to be air conditioned are not affected by either the heat of the sun or the prevailing winds, and that cool sanctuaries can be provided within the home, in the living room and bedrooms.

Home air conditioning has always been just around the corner in Australia, and will not arrive until quantity production of air conditioning units has been achieved, and that a marketing policy has been introduced somewhat similar to that originally adopted for the sale of broadcast receivers and domestic refrigerators, namely, the offer of a trial in the home.

Then the active co-operation of the Electric Supply authorities will be required, and it will surely be forthcoming when the electrical generating capacity has been increased. Meantime, any country home owner determined to possess air conditioning in his home can install the necessary plant and operate it by Diesel engine power, and so obtain comfort cooling and controlled humidity.

The first essential to increase rural development is to make living in the inland more attractive, and so arrest the drift to the cooler coastal cities.

Air conditioning can mean much in the development of Northern Australia, and it is generally agreed that Brisbane itself and all north of same should be fully equipped as far as public buildings, hospitals, shops and theatres are concerned, while it will be readily agreed that the further colonisation of the Northern Territory and New Guinea literally hangs on successful air conditioning for the preservation of the health of the white population of our officials and their families.

#### FACTORY CONDITIONING.

We know that air conditioning is a manufacturing necessity for some industries. They have no choice. We will also admit that air conditioning for comfort can also be brought into our factories. Has it succeeded where applied? In a recent survey in U.S.A. over 90 per cent. of the factory managements when approached agreed that air conditioning had improved the productivity of their workers. Fifteen per cent. reported a reduction in absenteeism, and 20 per cent. an increase in efficiency and morale. Over 50 per cent. reported that the most important improvement was in humidity control; 40 per cent. said that temperature control received first place, and cleanliness 26 per cent. This aspect of cleanliness, often overlooked, has special interest to all the food and lingerie and other lighter industries.

It will be admitted that the first essential in improving factory atmosphere is to reduce heat and remove odours and gases, the toxic especially. In isolated instances, good management has already provided these essential services, but there has been as yet no uniform codification of these provisions.

In this respect valuable research has been carried out in the U.S.A., and Industrial Health Engineering has been given a firm place in city administration. The chief concern is the removal of all hazards associated with industries, particularly the exhausting of all atmospheric contaminants and the prevention and control of all occupational diseases.

There are Federal and State departments in Australia able to advise factory managers upon minimum requirements, and to make recommendations as to suitable firms to undertake the work. In this respect there are Australian consulting engineers who will prepare designs and call tenders and supervise installations where necessary. The greater number of installations, however, have in the past been made by the ventilating and heating industry, numbering upwards of 90 firms in Australia and New Zealand. These firms have not sought Government subsidies nor outside capital, and have served Australia throughout two great wars, a depression, and two inflationary periods, and are now in sufficient strength to meet the great expansion of the second half of this century.

The reason of their strength is the correct organisation, of which each forms an essential part. The fan manufacturers supply the fans, equipment, and all essential auxiliaries, but do not contract for results. The engineers, however, do contract for results, and furnish the required designs and assume full responsibility for the success of the plants they install. This division of responsibility preserves the freedom of both sides of the industry. Australia can, therefore, offer to overseas interests well organised fan engineering services.

May I now review the recent past in more detail of finished work, and the equipment available to established and new industries.

**Ship Ventilation.** The record of the ventilating industry during the recent war was highly commendable. With reduced staffs and transport services they met the situation by taking their workshops to the docks. They disregarded ordinary hours of working, shift merged into shift, and the work went on continuously. In consequence, the usual slow work, slow because of its complexity, of duct fabrication, kept abreast of all the other trades, and the work of the greatest detail on ships, the ventilating duct work, did not drag, and the finishing dates were met.

All vessels built in Australia's ship building yards are equipped with pressure ventilating systems, and the centrifugal and vane-axial fans, Funkah-Louvre outlets, and the air filters are all of Australian manufacture.

The fitting of mechanical ventilating systems to all crews' quarters of our trading vessels and coastal carriers continues, this amenity now being required by Regulation to all vessels. All Defence vessels now building are most extensively ventilated to Royal and Australian Navy Standards. The mechanical draught fans to ships' boilers are also fully Australian made. Air conditioning plants are also being installed to all meat and food carriers to the design of the Australian Shipbuilding Board.

**Mining.** The metalliferous mining industry has received many large exhausting fans during the year, but the Coal Mining Boards of Directors have been diffident about purchasing these large fans, for reasons that can be fully appreciated. However, the steel industry has pursued a bold policy of coal mine improvement, and has ordered and received many large fans for their collieries.

More use is now being made of underground boosting fans and the vane-axial type is deservedly popular on account of its straight flow design, which conserves much space, and saves operating power on account of its high efficiency. The Joint Coal Board is rendering valuable service to the coal industry by assisting owners to procure this plant and assisting in the release of the essential materials required.

**Air Filtration.** This year has also marked a considerable development in new types of air filters, particularly in the local manufacture of electronic precipitator filters, which can remove from the entering air the previously uncollectable finer dusts and smokes. Three designs are now available—the Westinghouse Precipitron, the American Air Filter Corporation's Electro-matic, and for varied industrial applications the Cottrell Electrical Precipitator of the (American) Western Precipitation Corporation, which is applicable to Blast Furnaces, Smelters, Coal Gas Generating Plant, Cement Plants, Acid Plants, Paper Mills, and for the necessary recovery of the fly ash grit from all large Boiler Plants.

**Hospitals.** Improvement continues in the mechanical ventilation and heating of our public hospitals. The use of electronic precipitation type air filters has been referred to above; these form part of the air conditioning plants for operating theatres, which are being provided in all new hospitals in N.S.W., and also to the existing operating theatres in N.S.W. The heating of hospital wards in new hospitals will be carried out in a new form of radiant heating by which welded steel piping coils are embedded in the concrete floors, and hot water is circulated under automatic control.

**Heating Systems.** Another advance is the use of convector type hot water radiators by which copper finned copper piping is made up into small sized heating units and enclosed in ornamental metal casings. These are installed either free, standing, or recessed, and connected to either steam or hot water circulation piping.

Low pressure 20 p.s.i. steam boilers of all welded steel plate construction are now being made in Australia, meeting the shortage of British cast iron sectional boilers and water heaters.

The strong demand for forced fan circulation type unit heaters has continued. These are usually steam fed, but can be provided with additional finned heaters for connection to hot water circulation piping to give similar heating effect. Another advance has been achieved in the use of gilled copper piping made up in 10 foot lengths and connected up with flanges into longer lengths up to 40 ft. in total length for side wall heating or fixed overhead for down draught correction. The new aspect, of course, is the increase in prime heating surface by the 80 gills to the foot mechanically bonded to the copper piping.

**Home Heating.** The growing popularity of the air circulating non-contact coal grate has been in evidence. Floor type electric fan circulated convector heaters are off the market pending the return of the small motors required. The scarcity of steel piping has prevented the installing of central heating systems, and the portable electric radiant heaters have held the home heating market. Gas and electric heated console design convector heaters are available, but neither appear to be favoured with the active support of the gas and electric supply organisations, though Australian made.

**Dust Collectors.** Manufacturers can be supplied with the standard Cyclone centrifugal collectors through the trade, but the uncollected residue cannot always be discharged with the escaping air from dust collecting systems, particularly in residential districts, and collectors of higher efficiency must be used, particularly where the system is induced draft from boilers. In these cases special

(Turn to page 112)



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types can be supplied to manufacturers in the higher priority groups; these collectors are being made here under license.

I refer to the Multitubular all metal centrifugal type, the Multiclone, and the wet separation Rotoclone, and several other variations of the Cyclone principle. The multitubular textile design can also be supplied either as the main collector, when it is usually fitted with shaking mechanism to free the collected dust from the walls of the textile tubes, or as a supplementary filter to the standard Cyclone collector, when it removes the finer dust, that would otherwise be discharged to atmosphere.

The selection of the most suitable type is firstly a question of final erected cost, and secondly, whether the collected material is of value, in which case the purpose of the installation is to retrieve, the whole or over 90 per cent. of the material being processed, as in grinding processes.

Manufacturers can secure dust collecting equipment of whatever type required, including the necessary removal of process dusts that include silica dust, in which case the plant is required to meet Health Department standards of air purity.

**Air Filters.** With the exception of forced draft fans to accelerate combustion, all forced draft fans for pressure or plenum ventilating systems require an air filter of low resistance design to rid the entering air of the usual atmospheric dust of cities or of the higher concentrations found within manufacturing plants, and particularly in the heavy industries. The standard air filter is the adhesive oil coated unit, of 750 cubic feet per minute capacity, which are made up into sets by interbolting to the full capacity of the fan, such as, say, 50,000 cubic feet per minute. The best design contains two removable inserts in each unit, facilitating the periodic cleaning required, for which cleaning equipment is also available.

Efficient air filters are also available of cloth type, cleaned by vacuum cleaners and renewable. Water spray type air washers, and water film type air scrubbers, can also be supplied.

Another design employs the unit cell filled with glass wool, and arranged in groups which are water sprayed, and, therefore, self cleaning. This design is of special value where explosive dust is being filtered.

For all installations over, say, 30,000 cubic feet per minute, it has been found economical to use the rotating oil coated screen design, which is electrically driven and controlled so that the filtering curtain advances one-sixtieth of its height at 12 minute intervals. This filter has been successfully applied to the steel industry, and is made in Australia.

It will be apparent from this brief survey that modern equipment is available to all manufacturers for the treatment of the air handled by pressure fans and blowers.

**Fans and Blowers.** Australia's war effort received world-wide acclaim, and the arming of the nation, under the inspirational leadership of Mr. Essington Lewis, O.M., was the predominating factor. Steel in unmeasured quantity was required—special steels—for uncounted uses. Chemicals for explosives and fabrics and felts—magnesium—tungsten—the full range of the munitions of warfare.

All were supplied. It is fitting now to record that no artillery, machine gun, rifle, aircraft or war vessel could have been handed on to the fighting services without the aid of the pressure fan or blower. No special recognition was given to the fan engineering industry for its incessant toil in the making of these essential supplies, but the contribution was really a mighty effort, and the fans were ready when called for.

The fan designs were the world's best—of the highest mechanical efficiency procurable, and, therefore, requiring the least power consumption—in itself a great contribution, particularly when continuous operation was necessary, as it was.

These fans are now available as aid and essentials to all manufacturing industries of both centrifugal and axial flow (high efficiency propeller types) design. Capable of handling gases up to 1,400 degrees Fahrenheit, and air volumes up to 300,000 cubic feet per minute. The fan engineering industry is again ready for the higher production called for by our government, and it will not fail the nation.

**Education.** Before closing, may I say that the paramount need to safeguard the future of this industry is technical education, full for our designers and drawing office staffs, and part time for foremen and operatives. The curricula of our Universities and Institutes of Technology and Technical Colleges need extension to include the special studies necessary of the fundamentals of air conditioning, fan engineering and mechanical ventilation and heating practice. Some of these would be the thermo dynamics of air and water mixtures, refrigeration as applied to air conditioning design, heat transfer, radiant heating, automatic controls, industrial hygiene, air pollution, physiological principles involved in the health of workers, sound and vibration control, insulation of all factory buildings and homes, particularly tropical applications and protective treatment of workers exposed to high temperatures, etc.

The Institution of Heating and Ventilating Engineers of London has already established a National College with Diploma courses to provide drawing office personnel, fundamentally and soundly trained for their work and associationship courses of post graduate level, whose essential object is the training of students who may be expected to attain later to positions such as those of higher technical executives. Provision is also made for the training of operatives to provide a source of potential foremen and supervisors for the future.

It is also hoped to select apprentice masters who will undertake to guide and safeguard the welfare, contentment and progress of the trade apprentices. The Institution has also issued a loose-leaf "Guide to Current Practice" to all its members based on the work of its stipendiary research engineers, which is being added to continually.

Some reader may ask why is human comfort improved by air conditioning? I referred to its necessity for healthful and safe-living in our tropical north; somebody might say that the human body is to a certain extent self-regulating, and will adjust itself to variations in temperature, humidity, and air motion.

(Continued on page 252)





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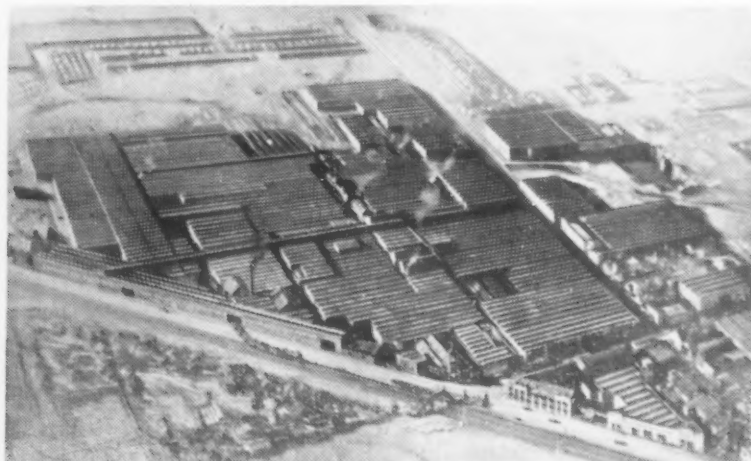
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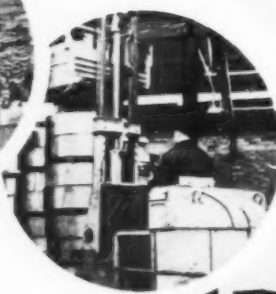
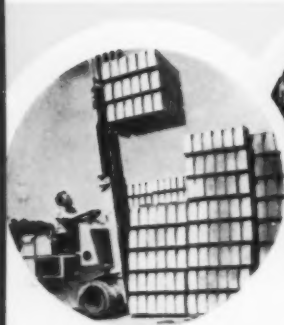


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The fur traders were first to force their hazardous way over the seemingly impregnable Rockies into the vast, rugged region of Canada now known as British Columbia. Hard on their heels, with the discovery of gold, came the prospectors, scratching feverishly at the surface of the earth for easy fortunes. But as the years rolled by and the veins of gold petered out, the children of the first adventurers were forced to turn their heads to the land in order to exist.

And in a country so densely covered with magnificent forests, it was only natural that they found a new prosperity in the massive fir, hemlock and cedar trees. But instead of safeguarding for future generations the wealth bestowed so freely on them by nature, a new race of lumbermen hacked their way indiscriminately into the virgin mass of timber. Their cry was "Cut out and get out," as they dragged the largest logs through the forests, tearing up the rich soil with its new growth.

To-day, British Columbia's timber industry is suffering from the folly of those pioneers, a folly unfortunately pursued by later generations well within living memory. Strenuous efforts are being made to rejuvenate the denuded forests and patch up the savage gashes of bare rock and earth. Industry now plans, not only for to-day, but for the children of to-morrow, and their children after them.



Breaking up natural pastures—Paterson Show, N.S.W. The Howard DH.22 Tractor and Rotary Hoe again proved its ability to produce a good tilth despite the waterlogged conditions.

There is, of course, a parallel in the early farming methods of most of the world's populated areas; a parallel stretching back as far as civilisation can remember, and on a far more serious scale.

In the beginning the soil was rich and vegetation flourished naturally, in balance with nature. Then man tilled the soil and found the seeds he planted grew with very little attention on his part. Or, if as sometimes happened, the soil seemed to weary of its man-made task, it was easy enough to move on to another plot. There was room to spare for all.

"Cut out and get out." "Dig out and get out." It was the same story on a gigantic scale, and because of it, civilisations perished as the vitality of the earth was exhausted, as the rich virgin soil became leached and useless, turning fertile lands into deserts, and corroding the surface of the earth with deadly, insidious erosion.

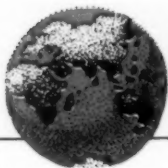
And once again, the follies of past generations have only recently been appreciated. The dust bowls of North America, the areas of erosion in Australia, South Africa, India and other continents have mostly been created within the last few centuries.

Only in comparatively recent times has it become generally appreciated that, to preserve the thin layer of soil on which the earth's population depends for its very existence, the organic matter content of the soil must be maintained. Thus the days when garden "refuse," wheat stubble, and green vegetative residues were burned or discarded are nearly over. Instead, these by-products of cultivation are being used to rejuvenate the earth. They are put back into the upper layers of the soil, where, in the process of decomposition, they may provide the organic matter so vital for maintaining soil fertility. Nor is this all. Farmers are growing green manure crops in rotation with "pay" crops to remedy the loss of organic matter caused by continuous cultivation, in order to obtain a better balance in the physical and biological factors of the soil. Science has shown that correct farming practices not only aim at improving the physical characteristics of the soil, but also at "servicing" the soil population — the myriad forms of animal and micro organisms that inhabit the soil's upper layer and play a predominant part in soil fertility.

With this new conception of soil conservation, there has been a growing appreciation of the value of rotary tillage. For rotary tillage, now a little more than a quarter of a century old in experience, has proved its exclusive ability to disperse decomposable or fermentable matter through the soil in the manner best calculated to build fertility and good crumb structure.

Rotary tillage is not, and never can be, the panacea for all agricultural production problems. But used intelligently, rotary tillage can, and does, offer almost every type of farmer better productivity and continued fertility for his land. And with the wide range of Howard Rotary Hoes at his disposal, the farmer of to-day can handle all manner of plant residues, from heavy cane trash to comparatively light green manure crops. He can tackle dense bracken, thistles, cornstalks and sod-bound pastures with ease, or prepare the desired degree of tilth preparatory for sowing.

The need to win back denuded or eroded earth in order to sustain food production for the earth's rapid growth of population; the vital necessity to ensure that no more good land shall deteriorate into man-made deserts; these two major problems facing agriculturalists to-day are ones in which rotary tillage will play an ever increasingly important part. As pioneers in Australia of rotary tillage, the firm of Howard Auto Cultivators Ltd., of Windsor Road, Northmead, N.S.W., may feel justifiably proud of its contribution to the farming communities of the world.



Howard Rotary Hoes and Tractors are in use in—

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Brit. Solomon Isles  
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Borneo

**HOWARD  
ROTARY  
TILLAGE  
IS  
ALWAYS  
GAINING  
GROUND**

## HOWARD ROTARY HOES & TRACTORS ARE WORKING AROUND THE WORLD



### The HOWARD Model "TWELVE"

New South Wales citrus grower turning in a crop of sick beans with a Howard "Twelve." His well-laden trees pay their own tribute to his skill and experience and, of course, to the value of Howard rotary tillage in maintaining soil fertility.



Howard model "Twelve," twin V-cylinder, 4-cycle, water-cooled 12 h.p. petrol engine. Three forward speeds and reverse. Governor controlled, special alloy heat-treated gears; safety clutch on rotor. Width of cut, 32" or 36"; depth of cut, 0-8".

Rotary tillage, through its proved ability to dispose decomposable or fermentable matter throughout the soil and produce the degree of crumb structure essential to soil fertility, offers a new conception in power farming.

For rotary tillage can, by leaving a residue on the surface at will, and/or partially incorporating organic matter into the soil immediately below, produce a better penetration of rainfall with less surface run-off, and a much greater degree of moisture conservation than has previously been possible.

There is no implement comparable with the Howard Rotary Hoe for turning in bulky green manure crops and giving an ideal mixture of soil and organic matter; no development in farming so promising for the future as Rotary Tillage, pioneered here in Australia by Howard Auto-Cultivators Limited, over a period of twenty-five years.

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The "Junior" 5 h.p. air-cooled engine, petrol fuel, 3-speed gear box, positive drive through heat-treated gears. Safety clutch on rotor. Width of cut, 18"; depth, 0-7". Power take-off.



The D.M.22, four-cylinder, four-cycle, water-cooled engine, 22.5 h.p. Five hoeing, five additional speeds and reverse. Width of cut—standard, 4' 6" and 5'; sugar cane model, 3'. Depth—standard, 0-6"; sugar cane model, 0-10". Hydraulic hoist, power take-off available.

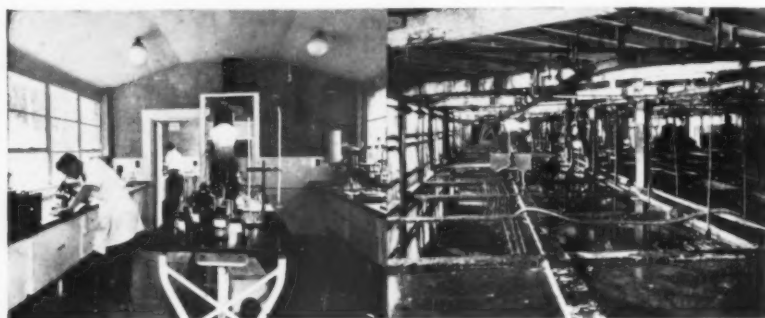


Howard Rotary Hoe attachment for Fordson Major Tractor. Can be used with or without Fordson hydraulic hoist. All controls operated from driver's seat. Friction safety clutch. Width of cut, 4' or 4' 6"; adjustable depth control, 0-8".

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In the extended variety of production and excellent factory layout, the Managing Director's recent visit to the parent factory at Cambridge, Mass., U.S.A., and the English factory, has had an important influence.

PERHAPS the most outstanding addition to the product range of the Carr Fastener Co. of Australia Limited is the recent introduction of the DOT line, "Trimount" Tubing and Wiring Clips. Previous to the factory's tooling up for the production of several patterns of these Clips for the Holden car, Australia was wholly dependent upon supplies from the overseas factories.

"Trimount" Clips are highly dependable, easily installed fasteners designed to hold two or more wires or tubes firmly together. Their positive action insures vibration-proof attachment, while the simplicity of their application reduces time to a minimum.

In general, the various types function in two different ways. Some fasten materials permanently, others can be removed and re-assembled as often as necessary. All of them can be easily inserted by hand, although small hand tools are sometimes utilised in volume production and special application.

"Trimount" Fasteners have proven to be exceptionally helpful to the leading manufacturers in the automotive, aircraft, radio and refrigeration fields. Some of the many uses to which they are being

put are the holding of panels, mats, carpets, trim, mouldings, plates and insulation materials, and wiring and tubing to rigid surfaces. Every "Trimount" Clip is rust-proof, and eliminates three parts, as compared with the old type screwed on clips.

It is to the credit of the production engineers of the Carr Fastener Company that "Trimount" Clips are produced on Australian developed machines with all Australian material. Many patterns are now available, and others are being added as required by manufacturers in the appliance, engineering, radio, electrical and automotive trades. Every Clip is rust-proof and remarkably durable.

Enquiries are invited by the Carr Fastener Company from all trades requiring serviceable clips in modern design. Such enquiries should be addressed to the Company's Sales Engineers in Adelaide, Sydney, or Melbourne. In Sydney, contact Mr. S. B. Tonkin at the Company's Branch, 85 Commonwealth Street, and in Melbourne, Mr. C. A. Muller at the Branch Office, 355 William Street. Or at the Adelaide Head Office, Royal Park, Alberton, S.A.



# Radio RECEIVER Industry



THIS review, from which only extracts are published in this article, is one of the series prepared for general information by the Division of Industrial Development in the Department of Post-War Reconstruction.

The review briefly examines the general demand and supply situation in the industry, the principal factors of production such as labour, material and equipment, and other relevant matters. It does not purport to be a detailed and comprehensive study of the industry. It has been based on the statistics and other data, not being of a confidential character, which are available in this and other Government Departments, and also, on the results of discussions by the Division's officers with various persons associated with industry.

The Division of Industrial Development will be pleased on application to discuss, and where possible to amplify, any matters relating to the industry under review. Such applications may be made to the Director, Division of Industrial Development, Wentworth House, 203 Collins Street, Melbourne, or to the Deputy Director, Division of Industrial Development, Phillip House, 119 Phillip Street, Sydney.

THE development of the Australian radio industry followed the establishment in this country of broadcast transmitting stations, the first of which was set up in 1923. Initially, receivers and parts were imported, but local assembly of imported parts was early undertaken on a limited scale.

The imposition, in 1929, of high tariff duties on imports, and subsequent increases and extensions of the scope of such duties, together with increasing demand consequent on the introduction of mains-operated receivers to replace battery operated sets, quickly led to the extension of local manufacture. Within twenty years the industry's output of radio receiving apparatus increased to nearly £4,000,000 per annum, not including other allied production valued at some £4-5,000,000 per annum. Demands on the industry for production of all types of communications, equipment for defence purposes during the recent war was a strong factor in this growth, doubling the industry's output in about six years.

The radio receiver industry has had a history of continuing technical developments, accompanied by improvements and adaptations of manufacturing processes necessary for the commercial application of such developments. At present, for example, consideration is being given to the possibility of introducing sound broadcasts on the very high frequency bands (frequency modulation), and television. On the manufacturing side, an automatic electronic machine has been built in the United Kingdom for making radio circuits at the rate of one every twenty seconds by a technique of printing the circuits in a metallic conducting material on a non-conducting base. In view of such developments, research is essential to this industry.

The technical processes involved in manufacture are concerned chiefly with light metal working, in particular the pressing, stamping and extruding of small metal parts. Electro-plating, wiring, plastic moulding of cabinets and accessories, assembly into complete receivers and inspection and testing are important processes.

Design of cabinets is also important in view of the demand for pleasing appearance as well as good performance in an article which takes its place as a piece of furniture in the home.

## THE GENERAL MARKET SITUATION.

In the immediate pre-war years, the demand for radio receivers averaged about 200,000 sets per annum, all of which were supplied by Australian manufacturers. The total current demand for all types of radio receivers (including radiograms) is estimated at about 260,000 sets per annum.

The demand for radio receivers is predominantly for domestic use, car and portable radios being more in the novelty field. The demand for domestic use arises from the replacement of worn-out sets, the installation of first sets in households where there is no receiver, and the installation of second or later sets where there are already one or more receivers.

As to replacement demand, an indication of the number of radio receivers in use from year to year can be obtained from statistics of broadcast listeners' licences, although these figures are, no doubt, an understatement.

### Number of Broadcast Listeners' Licences: Australia.

At 30th June, 1925	61,059
" " " 1930	311,648
" " " 1935	720,532
" " " 1940	1,212,260
" " " 1945	1,479,802
" " " 1948	1,845,915
" " " 1949	1,929,022

(1945 and later figures include licences for receivers in excess of one. Prior to July, 1942, one licence covered all receivers in any one dwelling unit.)

While the life of radio receivers varies considerably as between users and types of radios, the average life would seem to be between ten and fifteen years. Lately, there has been a strong tendency to replace rather than to repair radios more than ten years old.

Having regard to the numbers of radios now in use, the levels of production since the mid thirties, and the approximate average life of radios, current replacement demand is estimated at about 135,000 radio receivers per annum.

Replacement demand constitutes the largest part of total demand. As there are now, it is estimated, only about 100,000 homes in Australia which do not already possess a radio receiver, the scope

for new sales in the first-set field will depend largely on the expansion of the market. This will arise from increases in the population, both by natural increase and immigration, but will become effective mainly through increases in the number of dwelling units and the number of marriages. Some allowance must also be made for demand from the 100,000 homes which do not already possess a radio.

Taking all these factors into account, it is estimated that new first-set demand is at present at a rate of about 75,000 radio receivers per annum, and will be maintained at about that level while migration remains at its present high rate.

The sale of second sets to dwelling units where there is already a receiver has not to date been of primary importance. Licences for more than one receiver at 30th June, 1949, totalled 156,347. Allowing for considerable licence evasions in this field, it is probable that the existing number of second sets does not exceed 200,000. This is a field in which aggressive sales promotion is likely to create quite a large demand. However, demand for second sets will be affected by price and income factors far more than demand for first sets. A first set in every home is now regarded as an essential; a second set, particularly in larger homes, is a great convenience, but not a necessity. Having regard to these factors, it is estimated that second set demand at present is between 20,000 and 25,000 per annum, with the possibility of considerable increase in the future dependent on successful sales promotion, continuing economic prosperity and the availability of low priced receivers.

The demand for car radio receivers is mainly for new cars. Less than 25 per cent. of this type of radio sold is for installation in cars more than five years old. An indication of the current potential market for car radios is, therefore, new car registrations, which for the first five months of 1949 numbered 28,490 (excluding commercial vehicles, relatively few of which have radios). It is estimated that current demand is about 15,000 car radios per annum. It is obvious that there is considerable scope for expansion here, high prices being the principal factor limiting the market. Car radio sales tend to be seasonal, highest sales being in the summer holiday months.

The demand for portable radio receivers is also seasonal in character, being concentrated in the summer months, December to February. Current demand is estimated at about 10,000 portable radio receivers per annum. This again is a field in which sales promotion might result in an increase in demand, but this will depend considerably on general economic prosperity. Most sales are to young people and for use outdoors. Portables are not popular for household use because they are battery operated, and mains-operated receivers are preferred. Portables, therefore, cannot be regarded as in the second set field for household operation, except when adaptable to use on household current as well as batteries.

To sum up the current estimated demand for radio receivers:—

Household—replacement	135,000
new first-set	75,000
new later sets	25,000
Car	15,000
Portable	10,000
	260,000

The heavy pre-war sales of radios mean a probable increase in replacement requirements over the next few years, but this should be followed by a diminution of those requirements consequent on the decline in supplies available during the later war years. Later still, however, the post-war increase in sales should be reflected in increased replacement demand.

It was thought that replacement of radio receivers would be postponed, and demand greatly affected, by proposals to establish frequency modulation and television transmissions. While initially this influence was quite strong, it has now lessened considerably, and replacement should not in the future be much delayed by this factor. The increasing popularity of the less expensive mantel and table model radios is a factor tending towards a shorter life for radios, and consequently towards an increase in annual replacement demand.

Barring any marked change in general economic conditions, therefore, increasing replacement requirements should give an upward trend to demand over the next few years, but other sources of demand should on present indications be rather steady.

The largest potential source of an increase in future demand is second set sales. Here, low prices in relation to income levels would be essential.



Demand for radio receivers since the end of the war has been inflated by the backlog which accumulated during the war years when manufacture of radio receivers for the civilian market was prohibited. This accumulated demand has now been met, and will no longer be a factor substantially affecting sales.

When frequency modulation and television broadcasting is introduced into Australia, the consequent demand for receivers to pick up such broadcasts will have a considerable effect on the future demand for this industry's products.

Whereas F.M. is merely a different method of sound broadcasting, television has a new entertainment and educational value. The potential market for television receivers would appear to be almost as large as for radio receivers. (A recent consumer survey in the United States of America showed that 86 per cent. of American homes would like a television receiver). However, sales will depend initially on the availability and quality of television services, and on the cost of receiving sets.

Television transmitting stations are to be set up in the six Australian capital cities, and are expected to be in operation in about two years. The Australian system is to be based on a 625 line picture, compared with the 405 line United Kingdom system and the 525 line United States system. Present estimates place the probable cost of television receivers in Australia at between £55 and £100 each, which will tend to limit the market to the well-to-do.

An idea of the potential Australian market for television may be gained from overseas developments. In the United Kingdom, for instance, production of television receivers in 1947 was 28,200. In December, 1948, production was 13,265 per month, and in February, 1949, 120,100 television receivers were in operation. Television receiver production in the United States of America in 1948 was approximately 975,000, and it has been estimated that by 1954 there will be nearly 20,000,000 sets in operation in that country. Receivers in both these countries are available at much lower prices than the estimated Australian cost—in the United Kingdom the cheapest receiver is sold for £46 sterling (or about £A57). In the United States of America prices range from about £A60—one firm has announced its intention of producing a small table model for as little as £A30.

#### EXPORT MARKETS.

Exports of Australian radio receiving sets, complete or substantially complete, increased from £A25,597 in 1939-40 to £A96,371 in 1947-48, the principal markets now being in Malaya, Hong Kong, Palestine and the Pacific Islands. The value of radio receiving parts and accessories exported fell from £A46,357 in 1939-40 to £A38,714 in 1947-48. Exports during the war years were of little commercial significance as these were exports, on behalf of the Commonwealth Government, of military equipment and stores to overseas forces. The principal markets for radio receiving parts are in New Zealand and the Pacific Islands.

The number of valves exported in 1947-48, 28,008, shows a decrease on the figure of 52,117 for 1941-42, the earliest year for which separate details are available, but this was inflated by the inclusion of Government exports of war equipment and stores. The principal market for Australian made valves is in New Zealand. The value of exports of Australian made transmitting sets and transmitters and receivers, combined as one unit, has increased from £A96,925 in 1941-42 to £A103,638 in 1947-48, the principal markets being in New Zealand and Hong Kong.

Provisional export figures for the nine months ended March, 1949, indicate a considerable decrease in exports of complete sets, and a considerable increase in exports of parts, valves and transmitting sets, etc.

Future export markets for Australian radio receivers and parts appear to be small. The manufacture of radio receivers is conducted on a large scale in many overseas countries, and recent reports indicate that there is a surplus in some countries. Overseas prices tend to be lower than here, and in particular prices in the United States of America are in some cases only 50 or 60 per cent. of Australian prices. A limited market in New Zealand, India and the Pacific Islands and perhaps South Africa is possible because of Australia's proximity to these markets, but considerably reduced prices seem to be necessary to open up any very large overseas markets.

#### AUSTRALIAN PRODUCTION.

Australian production of radio receivers is sufficient to meet all local demands, and for 1948-49 is estimated at about 300,000 radio receivers (including radiograms), although the current rate of production is falling below this figure. If the demand for radio receivers should increase markedly, the industry would have no difficulty in increasing production sufficiently to meet such demand. In fact, many of the large radio producers are engaging in manufacture of other domestic electrical appliances to take up the slack in their productive capacity.

Production in this industry falls broadly into two classes:—

- (a) Brand or proprietary lines—each manufactured and sold at substantially the same price all over Australia under the one well known and widely advertised trade name.
- (b) Non-brand lines—receivers are supplied to retailers and distributors and sold under any name that the retailer might wish to affix. In this case, the same receiver may often be sold under a variety of different names at varying prices.

The branded lines are manufactured by the larger firms which make substantially all the parts they require in their own factories. Non-brand lines are produced mainly by smaller firms which buy in most of their parts from other manufacturers and which merely assemble.

Should television and frequency modulation broadcasting be established, Australian manufacturers should be able to supply the market for receiving sets. Many large firms are experimenting in the production of such sets; F.M. receivers and adaptors have already been produced experimentally and the industry is merely awaiting the determination of standards for the television system before proceeding with production of experimental sets in this field. Initially, it is expected some parts for television receivers will be imported; particularly the cathode ray tube. Apart from this, the industry has

shown from its wartime production of radar and similar equipment that it is capable of producing to the fine tolerances and exacting specifications necessary in the manufacture of F.M. and television receivers.

#### LABOUR.

No official statistics are published of the numbers employed solely in the manufacture of radio receivers. Such manufacture is included by the Commonwealth Statistician in the industry sub-class "Wireless Apparatus," which is wider than the industry under review.

Slightly over half the employment in the industry is in New South Wales; Victoria accounts for about 31 per cent.; South Australia for 16 per cent., and Queensland 2 per cent. There is no manufacture in Tasmania, and the amount in Western Australia is negligible.

About one-third of the males employed and less than one-tenth of the females may be regarded as skilled. Adults form about 80 per cent. of the labour force.

#### EQUIPMENT IN FACTORIES.

The principal types of machine equipment used in the manufacture of radio receivers and their components are presses, lathes, drills, stamping machines, extruding machines, coil winding machines, dies, jigs, plastic injection and compression moulding machines, electro-plating baths, heating and drying equipment and testing and research equipment.

Most large firms have well equipped tool rooms to make their own dies and tools and to handle maintenance and repair of machines.

Many of the machines used are of Australian make; the more complex automatic multiple purpose machines are imported from the United Kingdom or, when dollars are available, from the United States of America. Some firms have made their own machines, copying from or adapting the designs of imported machines to their special requirements. In particular, two large Australian firms have made for themselves complex machines for use in the manufacture of valves.

The machine equipment of the industry is generally modern and efficient. Progressive managements are replacing non-automatic with automatic machines.

#### RESEARCH.

Many of the large firms in the radio industry have considerable research facilities, most of which are used for experimenting with, and adapting to commercial application, new inventions or discoveries in the radio field. At present, these facilities are of particular value for experimental work in production of frequency modulation and television equipment. Original research is more limited, few firms having the resources to devote to such work. However, a number of Australian firms benefit from the research carried on by their overseas principals or associates.

Research in the design of radio receivers is important from two points of view. In the first place, cabinets must be designed to please the eye of the buying public; in the second place, the design of cabinets has a considerable effect on the technical performance of a receiver. Some firms have special laboratories or sections to handle these aspects.

Special testing equipment is installed in all major firms for the testing of radio equipment for conformation to standard electrical specifications.

#### DECENTRALISATION.

The most notable decentralisation in this industry has been the transfer, in 1946, of the three factories of Philips Electrical Industries (Aust.) Pty. Ltd., with all their machinery and equipment, from Sydney to Hendon, South Australia, where the firm took over a former munitions factory. Other large firms have set up branches or sections away from the capital cities. These experiments in the decentralisation of the industry have been successful. The manufacture of radio receivers is a light engineering industry, and decentralisation is technically feasible. The service facilities available in any of the large provincial towns would be sufficient for the industry. However, the advantages of location at or near the major markets, sources of raw materials and industrial and commercial services generally are substantial, and most of the important manufacturers are still located in the capital cities or their suburbs.

#### GENERAL OBSERVATIONS.

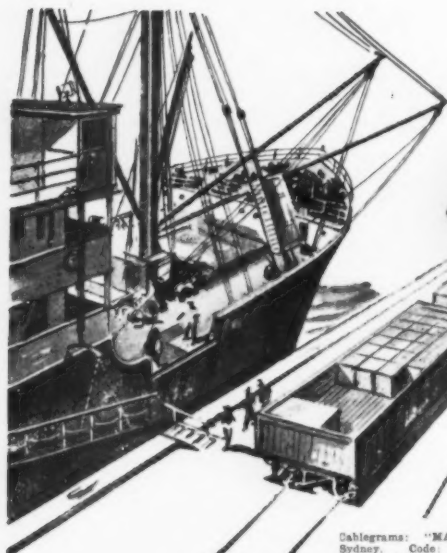
The radio receiver industry in Australia is a well organised and efficient industry capable of producing all of Australia's requirements of radio receivers and parts except some types of valves. The bulk of the manufacture is in the hands of a few large firms, whose products are sold under well known trade names on a national market at standard prices.

A large part of Australia's production of broadcast transmitting equipment and considerable amounts of telegraphic and telephone equipment are made by a few large firms in this industry. Most of the large firms also produce a number of other domestic electrical appliances. These provide alternative lines of activity which may take up, and to a degree have taken up, some slack on the radio side. It is true, however, that the market for domestic electrical appliances is largely as dependent on the continuance of general economic prosperity as is that for radios.

Several firms in the industry have announced plans for extension of activities or increases in capital to provide for expansion. Most of these firms are interested in a number of electrical and electronic products as well as in the manufacture of radio receivers. One firm has, in conjunction with an English firm, formed a new subsidiary company for the production of television equipment. On the other hand, three medium-sized firms have gone into liquidation within the last 18 months.

Many of the large firms are associated with the principal overseas manufacturers of radio equipment and have access to their "know-how." These associates have, in the past, had a considerable influence on the development of the industry in Australia, and they can be expected to assist Australian manufacturers in the development of manufacture in the Frequency Modulation and Television fields. These and other prospective developments in radio communications should assure the industry of a progressive future.





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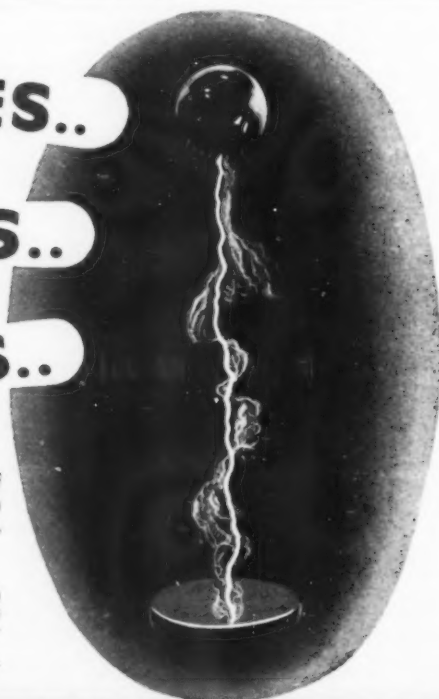
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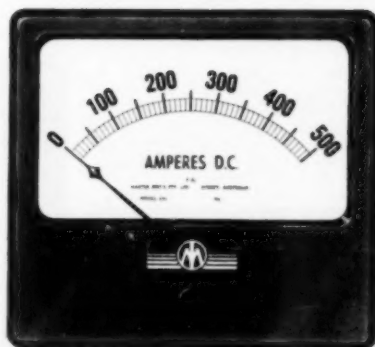
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by A. Denning, B.Sc., Dip.Ed., A.S.T.C., Director of the N.S.W. University of Technology.

**LEADING** educationists and industrialists both in Australia and abroad acknowledge that with the establishment in N.S.W. of the first University of Technology in the British Empire, Australia has been given the opportunity of making important advances in the field of technology. With the co-operation of all interested in the young people of this country and its industrial development, there can be no doubt that the N.S.W. University of Technology will fulfil the obligations which it has undertaken.

**B**EHIND the development of the New South Wales University of Technology is a history of gradual but extensive realisation of the importance of technological training. Government sponsored surveys in a number of countries testify to this widely recognised importance, and among them might be cited particularly the Percy Report of 1945 in Great Britain; the Report to the President of the U.S.A. in 1945; the report to the British Parliamentary and Scientific Committee on Colleges of Technology and Technical Manpower in 1947; and the report of the President's Commission on Higher Education in the U.S. in 1947. These are but a few instances of the recognition, now world-wide, that application of science to industry lies behind survival in the world's markets, improved standards of living, and even survival as a nation.

These reports, based on long and careful investigation, formulated systematically a number of observations made by scientists and technologists the world over. It had been observed, for example, that a country like Switzerland, with no coal and with natural resources and scientific research no better than in the United Kingdom, nevertheless, improved its income per head from two-thirds that of Great Britain in 1881 to equality in 1939. In Switzerland during this period much more attention was given to the application of scientific research and to technical education.

It was also observed that for many years the U.S.A. has been pouring into her industries highly trained graduates from her technical universities, from the M.I.T., California Institute of Technology, Carnegie Institute, and others. American industries have flourished and America has been able to supply enormous quantities of equipment under Lend-Lease and Marshall Aid programmes. It was to this country that outstanding British scientific discoveries such as radar and penicillin were sent because rapid and large scale manufacture was possible there as nowhere else.

Many observations such as these suggested strongly that technical education is essential for modern industrial development. The reports to which reference was made now leave no doubt whatever about the causal connection that exists between technological training and applied research, and industrial success. A comment by Capt. A. R. Blackburn, M.P., Deputy Chairman of the British Parliamentary and Scientific Committee, expresses this aptly: "We have to realise that the problem of producing atomic energy in quantity is not a matter of secrets. It is the need for a great organised effort of scientists, technicians and engineers, which culminates in an engineering, rather than a scientific, miracle."

I claim we fail in applied research throughout the Commonwealth. Our competitors cash in on many things we invent because they do applied research more quickly and more progressively.

The immediate lesson of the Russian atomic bomb shock is the need for a great improvement

in applied science here and throughout the Commonwealth."

It is from this background that the University of Technology has come into being. Just as the great technological institutes in U.S.A. and on the Continent have helped to increase output per man hour and produce better and cheaper consumer goods along with higher wages, so will the N.S.W. University of Technology and similar institutions as they develop in Australia help us to achieve these objectives. Their rapid establishment and expansion is of



Mr. A. DENNING,  
Director, University of Technology.

the highest importance to industry and to the Commonwealth.

### THE UNIVERSITY OF TECHNOLOGY.

The Act to incorporate the N.S.W. University of Technology was passed by the New South Wales Parliament in April, 1949. The University has been established as a body corporate with perpetual succession and statutory authority to assume responsibilities similar to those undertaken by other Australian universities.

The Act defines the objects of the new University to be:

- (a) the provision of facilities for higher specialised instruction and advanced training in the various branches of technology and science in their application to industry and commerce; and
- (b) the aiding by research and other suitable means of the advancement, development and practical application of science to industry and commerce.

Action has been taken in accordance with the legislation adopted by Parliament to constitute a governing Council of the University.

The Council is representative of Parliament, industry and commerce, the trade unions, technical education, professional bodies, the University of Sydney, and the teaching staff of the new university, its undergraduates and graduates and, upon the final election will consist of thirty members.

The governing Council, under the authority given to it by the Act, may act in all matters concerning the University in such manner as appears to it best calculated to promote the objects and interests of the University.

The Council has also been given power to establish and maintain branches, departments, or colleges of the University of Technology at Newcastle, Wollongong, Broken Hill or such other places in the State of New South Wales as the Council deems fit. Action has already been taken to secure the provision of first year instruction in four degree courses at Newcastle in 1950.

Before this Act was passed, the University had already made considerable progress under the guidance of a Developmental Council appointed in August, 1947.

Realising the urgency of industry's need for trained technologists, the Minister for Education, the Hon. R. J. Heffron, M.L.A., who was responsible for bringing down the legislation in Parliament, arranged for the full facilities of the Technical Education Department in New South Wales to be made available to the N.S.W. University of Technology pending the erection of its own buildings. The University has functioned up to the present in buildings at the Sydney Technical College, Broadway, Sydney, and this has permitted considerable progress to be made.

Work is well under way on the foundations of the first of the permanent buildings that are to house the N.S.W. University of Technology on an area of land at Kensington reserved for University purposes. It is expected that this building will be in use in March, 1951.

In March, 1948, degree courses were established in Civil, Electrical, Mechanical and Mining Engineering. Courses in Applied Chemistry and Chemical Engineering, and a post-graduate course in Electronic Engineering were established in 1949. These courses already in operation compare favourably both in subject content and in lecture and laboratory time with those at leading world Universities and technological institutions overseas.

Further technological courses are being planned and an Architecture degree course was inaugurated in March, 1950. Action is proceeding with a view to the establishment of a degree course in Metallurgy, and preliminary investigations have been undertaken with regard to the commencement of degree courses in Wool Technology and in Management.

A decision has also been made by the Council of the University to proceed with the establishment of Chairs of—

Metallurgy,  
Civil Engineering,  
Mechanical Engineering, and  
Applied Mathematics.



together with a Chair in one of the Humanities.

One of the new institution's major functions will be to provide a wide range of post-graduate courses which will enable experts in industry, as well as graduates, to pursue further studies in work of a new or more advanced nature. In the application of these plans the staff of the University will be of major importance, so that it is a cardinal principle of policy to secure the services of men who are not only academically outstanding in their particular technological field, but who also possess an excellent background of industrial experience. The appointment of the undermentioned professors to foundation chairs of the University has been very favourably received both in Australia and abroad. These men, four of whom have come from England to join the staff of the University of Technology, are well qualified to make a real and vital contribution to the development of Australian industry.

Director: A. Denning, B.Sc., Dip.Ed., A.S.T.C.

Registrar: J. C. Webb, M.Sc., Dip.Met. Min., F.G.S., M.I.Min.E.

#### Foundation Chairs:

Chair of Chemical Engineering: Professor J. P. Baxter, O.B.E., B.Sc. (Bham), Ph.D. (Bham), M.I.Chem.E.

Chair of Mining Engineering: Professor D. W. Phillips, B.Sc. (Wales), Ph.D. (Cantab.), Dip. Met. Min., F.G.S., M.I.Min.E.

Chair of Electrical Engineering: Professor H. J. Brown, B.Sc., M.E. (Syd.), A.M.I.E. (Aust.).

Chair of Architecture: Professor F. E. Towndrow, F.R.I.B.A., F.R.A.I.A., M.T.C.P.I. (Aust.).

Chair of Applied Chemistry: Professor A. E. Alexander, M.A., B.Sc. (Reading), Ph.D. (Cantab.), F.Chem.Soc.

Chair of Applied Physics: Professor N. F. Astbury, M.A. (Cantab.), F.Inst.P., A.M.I.E.E.

Following the announcement of the appointment of Professor A. E. Alexander to the Chair of Applied Chemistry at the University of Technology, applications were received from two of his post-graduate students at

Cambridge University for permission to continue their studies with him in Sydney. The University of Cambridge awarded each of these students a Goldsmith's Hall scholarship to enable them to do this. Cambridge University will recognise the work done at the N.S.W. University of Technology as part of the work to be submitted for the Ph.D. (Cambridge) degrees.

In addition to teaching, the staff of the University is engaged on an extensive programme of research such as industry is often unable to undertake. Industrialists will be invited to bring their problems to the University, which will co-operate on such projects with the Commonwealth and State Departments devoted to science and research, and with other educational institutions. To ensure proper continuity and reasonably rapid progress, Research and Technical Officers have been appointed to assist the lecturing staff. These officers have no teaching commitments, so that their efforts are wholly devoted to the setting up of laboratories and the organisation of the research work. A building, comprising 21,000 square feet of floor space, is being altered structurally to serve as the first research centre, and a considerable amount of machinery and equipment is on order.

A high pressure pilot hydrogenation plant used in research on the production of oil from coal has already been installed, and the Chemistry Department has assembled a Hilga Spectrometer, an electron microscope and an infra-red spectroscope. In this department, investigations are proceeding on natural products of plant origin in Australia, and on the quicker and more accurate determination of inorganic substances using semi-micro analytical techniques.

The Department of Mining Engineering has collaborated with the Joint Coal Board and Colliery Proprietors in their work of rehabilitation of the coal industry, and will continue to co-operate with all mining authorities on problems such as spontaneous combustion, strain control, and shot-firing and the efficiency of blasting. Activities in civil engineering are directed to the adaptation of overseas research to Australian conditions and to problems peculiar to Australia, including soil stabilisation, building materials and surveying problems.

X-ray crystallographic diffraction work on metallurgical and dielectric materials in the Physics Department is co-ordinated with metallurgical research, and a second programme in the field of vacuum physics and the development of special electronic valves is already in operation. Work on the design of electrical calculating machines for mathematical analysis in the civil and electrical fields is being done in the Electrical Engineering Department.

Special features have been introduced in the planning of University of Technology courses. The first is the extensive practical experience in industry which supplements lecture and laboratory work at the University. For example, Engineering students in the new courses gain approximately five months' experience in industry each year, this practical work being carefully organised and supervised by officers of the University.

Secondly, there will be in all faculties compulsory courses in language and literature, human relations and contemporary civilisation. Such courses will avoid the handicaps which arise from narrow specialisation. Graduates of the N.S.W. University of Technology will be not merely technical experts, but technical experts with a broad understanding of human affairs.

A drive for greater industrial efficiency brings a danger that the social responsibility of professional men and the social significance of research may be overlooked. The tendency towards isolation from social, moral and political issues of an increasingly large section of the community cannot be reconciled with the welfare of the individual or of the nation as a whole. Technologists should be willing and able to play a leading role in the understanding, clarifying and determining action upon those political and social issues on which the future peace, freedom and prosperity of the world depend. In the University of Technology every effort is being made to ensure that each student receives such instruction as will enable him to develop his latent capabilities for work and thought, and to fit himself to assume the social and political responsibilities inherent in our way of life. All fields of study are designed to supplement each other, none being peculiarly or exclusively "cultural," but each contributing to the complete education of the individual.

## QUEENSLAND'S INDUSTRIES PROGRESSING.

(Continued from Page 74)

eventually have an output of 50,000 bricks a week, and the manufacture of tiles and earthenware pipes is being considered.

Walker's Foundry, of Maryborough, has acquired a 20 acre site at Mackay on which a large and up-to-date works is to be established.

The power alcohol distillery at Sarina, near Mackay, has an annual output of over 2,000,000 gallons of power alcohol from approximately 10,000,000 gallons of molasses. The Company is now considering the installation of a plant to manufacture 2,000 tons of dry ice from the carbon dioxide produced during the fermentation process. The recovery of potash from the waste liquor from power alcohol manufacture is also being investigated.

The meat works at Gladstone is expanding the capacity of its works annually, and the number of hands employed has more than doubled in the past ten years. The firm's laboratory has undertaken investigations into the canning of fish, fruit, and vegetable products.

The State Government is also investigating the economic prospects of establishing a number of canneries in fruit-growing areas along the coast.

Since 1929, legislation has been operating for the rendering of financial assistance to industries. An Industries Assistance Board has been appointed to investigate and furnish reports and recommendations to the Minister on applications by industrialists for financial assistance. Amongst the many companies so assisted are: Mt. Isa Mines Ltd., £625,000; North Australian Cement Ltd., £200,000; Tableland Tin Dredging N/L, £160,000; Hornibrook Highway Ltd., £100,000; Blair Athol Open Cut Collieries Ltd., £33,000; Dittmer Gold Mines Pty. Ltd., £30,000; Morris Woollen Mills (Ipswich) Pty. Ltd., £26,400.

In addition to the financial assistance given to approved industries, the technical officers of the Secondary Industries Division and other Government Departments are available to give technical and other assistance at all times.

## SOUTH AUSTRALIA'S INDUSTRIAL FUTURE

(Continued from Page 78)

Having overtaken many of the wartime shortages, we must devote ourselves to the solution of long-term problems. I represent, as a winemaker, an industry going back to the earliest days of the State, and which subtly connects primary and secondary production.

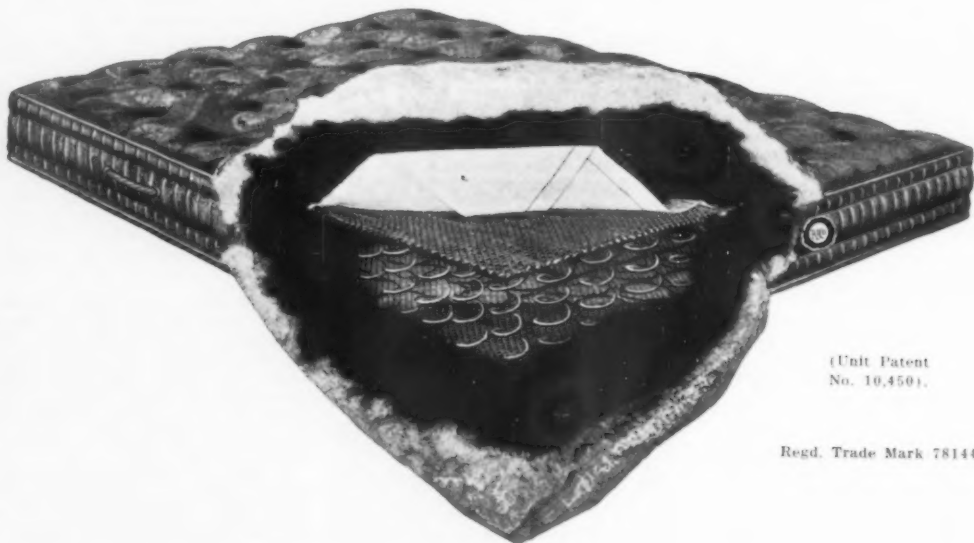
Owing to the steady and growing inflow of migrants we will need to increase primary production, particularly of food, to meet the needs of a larger population, while increasing our exports to a world that has an absorption capacity far greater than it has been able to satisfy since the war.

Secondary industry is called upon to co-operate with primary industry by supplying the producers' needs in the matter of tractors, trucks, fuel, fencing wire, iron for buildings, packaging materials, fertilisers, and the many other things the producer requires.

If all sections of the community combine in this effort it should not be necessary to send abroad for steel products at high cost to supply the farmers' needs while our own steel mills are employed at only about two-thirds capacity.

The more intensive development of the processing of the products of our primary industries, which should go hand in hand with the wonderful growth of our general manufactures, is a matter I would submit for the consideration of our manufacturers.

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- (b) Upholstered with curled hair, garnetted cotton wadding and coconut Fibre Pads.
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# "NATA"

## CO-OPERATIVE TESTING

### *In The Service of Industry*



## NATIONAL ASSOCIATION OF TESTING AUTHORITIES

(By R. V. F. ELDRIDGE, B.C.E., M.I.E., Aust.)

SINCE 1945 there has been developing in Australia an organisation to co-ordinate, on a voluntary basis, the testing services of the nation, bringing together the proprietors of governmental, public and private testing laboratories.

Representatives from the Commonwealth and the six State Governments, from public authorities, the learned societies and from industry, have formed a nation-wide Council, six State Committees and eight specialist scientific committees. In 1948, by agreement between these Committees, a practical set of Regulations to control the membership was issued.

THE Council and the Committees of Nata have now set out to secure as members, those Commonwealth and State Departments, other instrumentalities, organisations and persons operating testing laboratories which are acceptable by the Association for registration, and who desire their laboratories to act as collaborating laboratories in providing a national testing service.

#### OBJECTS.

The main objects of the Association are:

1. To organise a national service which will provide testing facilities to meet the needs of Government, industry, and commerce, and thus assist in maintaining the products of industry at a high standard.
2. To secure the collaboration, on a voluntary basis, of testing laboratories throughout the Commonwealth.
3. To investigate the standard of staff and equipment possessed by laboratories submitted for registration and to approve and register such laboratories in respect of specified classes of tests for which this standard is deemed to be satisfactory. Laboratories so registered are hereinafter referred to as registered laboratories.
4. To authorise the registered laboratories to endorse in the name of the Association certificates of test issued by them for those classes of tests for which they are registered.
5. To ensure that the testing equipment at registered laboratories is calibrated and checked periodically either with the national reference standards at the C.S.I.R.O. National Standards Laboratory or in such other ways as may be deemed appropriate, and that the standard of competence of the testing staff is periodically examined.
6. To secure uniformity in methods of test at registered laboratories where desirable.
7. To assist in securing additional testing facilities when necessary.
8. To promote the recognition of registered laboratories as impartial authorities whose certificates of test will be accepted throughout Australia.
9. To encourage the utilisation of the

testing facilities available at registered laboratories.

10. To encourage the installation of testing equipment in industry and the greater use of routine testing where



Mr. R. V. F. ELDRIDGE

this would be conducive to better production control.

11. To encourage and assist in the formulation and adoption of Australian Standard Methods of Test.
12. To procure the recognition of the Association throughout the British Commonwealth of Nations and in other countries.
13. To co-operate with any other organisations with kindred objects. The first of these epitomises the other twelve objects.

#### CALIBRATION.

NATA is vitally interested in the calibration or measuring of the accuracy of all gauges, measures, weights and instruments used for testing or controlling the specified properties of materials, processes, machines or finished manufactured goods. If Australian industry is to advance, near enough must not be considered good enough.

The Weights and Measures (National Standards) Act, 1948, of the Commonwealth of Australia makes provision for the unit of measurement of any physical quantity. These

shall be the sole legal units of measurements of such quantities in Australia.

When it is necessary to find whether a measurement has been made in terms of the appropriate Commonwealth legal units of measurement, the Act lays down that comparison or reference shall be made with the appropriate Commonwealth Standard of measurement, or with a working standard maintained by the Commonwealth or with a derived standard that has been verified and re-verified as required, by reference to the Commonwealth standard or the working standard.

Measurements are not legal in the Commonwealth unless they are verified in such a manner.

The National Association of Testing Authorities will arrange for members or prospective members the privilege of calibration of instruments or measuring devices in terms of the Commonwealth standards.

The fields of testing for which proprietors of testing laboratories may apply for membership of NATA are:—

1. Metrology.
2. Mechanical Testing.
3. Electrical Testing.
4. Photometry.
5. Temperature Measurement.
6. Industrial Radiography.
7. Chemical Testing.
8. Biological Products Testing.

In each of which there has been set up a registration committee of scientific experts acting in voluntary capacity to advise the Council.

Applications for registration of laboratories are referred by the Council to these committees. Arrangements are made for groups of assessors to visit the interested laboratories and report on staff, equipment and laboratory practice.

The registered laboratories become the members of the Association and will eventually provide elected representatives to the State Committees and the Council, thus making the organisation to a large extent self-governing.

The Council of the Association invites manufacturers interested in the aims of the organisation to contact the office of the Registrar, 16 Wyld Street, Potts Point, Sydney.

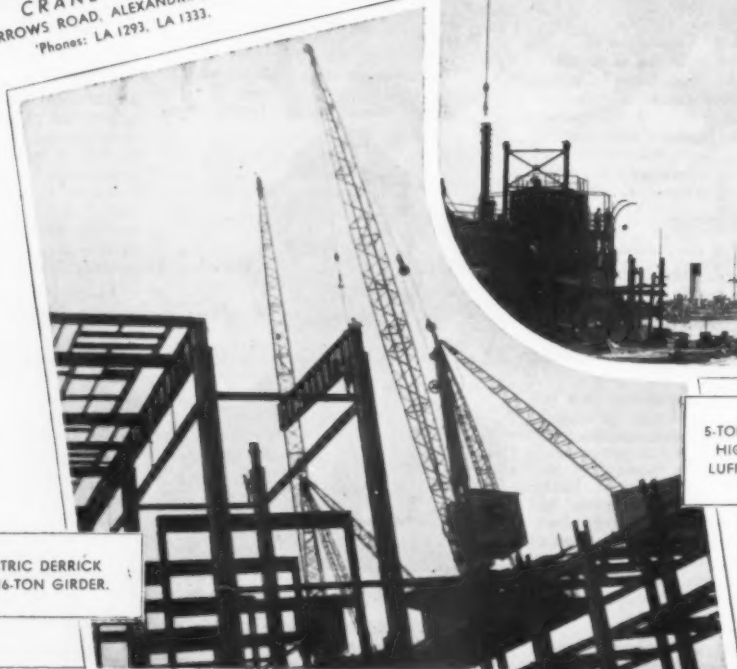


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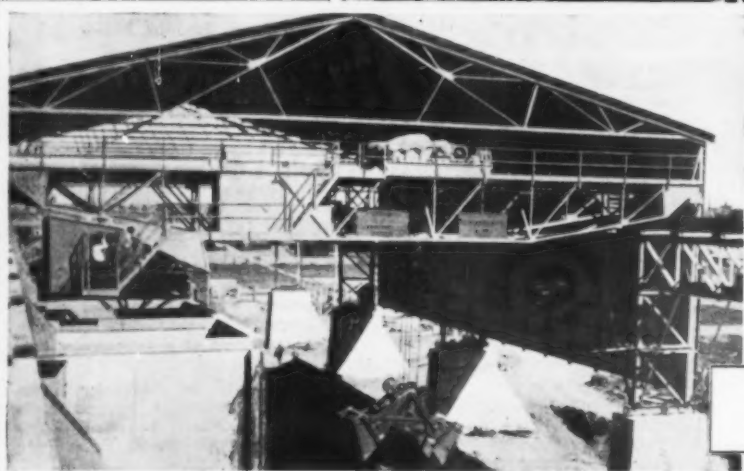
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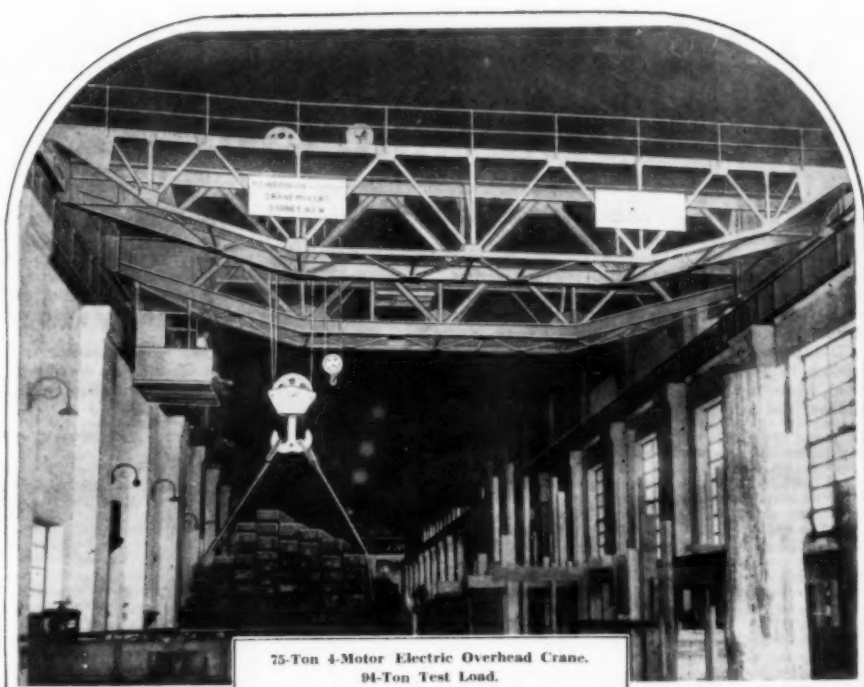


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# PAPER AND PAPER BOARD AUSTRALIAN PULP,

Review prepared by the Commonwealth Division of Industrial Development

**T**HIS article is an excerpt from a Review prepared by the Division of Industrial Development, and is one of the series of Brief Reviews of Australian manufacturing industries.

It briefly examines the general demand and supply situation in the industry, the principal factors of production such as labour, material and equipment and other relevant matters. It does not purport to be a detailed and comprehensive study of the industry. It has been based on the statistics and other data, not being of a confidential character, which are available in this and other Government Departments and also, on the results of discussions by the Division's officers with various persons associated with the industry.

The Division of Industrial Development will be pleased on application to discuss, and where possible to amplify, any matters relating to the industry under review. Such applications may be made to: The Director at Wentworth House, 203 Collins Street, Melbourne; or to the Deputy Directors, Phillip House, 119 Phillip Street, Sydney; Coronation House, 113 Edward Street, Brisbane; and 1st Floor, Bank of N.S.W. Chambers, King William Street, Adelaide.

**T**HE paper and paper board industry in Australia was established in New South Wales in 1864 and Victoria in 1868. There was steady progress in the industry in certain fields such as paper board and wrapping paper, and by 1939 it had reached an output of nearly 100,000 tons, produced mainly from waste paper and imported pulp. About 1939, after many years of intense effort, production of pulp for paper making from Australian Eucalypts was established.

It had long been believed that the production of satisfactory pulp for paper making from the native eucalyptus timber was impracticable, and the proposal to do this was, in fact, questioned by paper exports from overseas. However, courageous industrial enterprise, extensive research, and the expenditure of large sums of money on preliminary tests, have now proved the suitability of Australian timbers for the manufacture of paper and paper board.

The growth of the industry here in recent years has been most marked, and the consolidation since 1939 has created a firm base for the further expansion which all companies are planning and are, in fact, already carrying out. To-day the pulp and paper industry is operating with a capital of more than £15 million, with pulp plants in Victoria and Tasmania producing pulp from Australian eucalypts, whilst in South Australia pulp is being produced from locally grown softwoods.

With the development of the industry there has been a widening of the range of products, as well as an increase in production of the established lines; and the establishment of new mills since 1938 has opened up entirely new fields of production. This review deals with the whole range of production, under four categories—newsprint, paper board, wrapping paper, and other products such as printing, writing and tissue paper. It does not cover any subsequent processing which may take place after the paper or board has left the paper mill, such as the manufacture of carbon and waxed papers or the conversion of the paper or board to containers, or packaging.

## NEWSPRINT.

Of the various products dealt with in this article, newsprint represents the largest single item of demand, and in 1938-39 represented approximately half of the total tonnage of Australian consumption of paper and paper board.

The consumption of newsprint in Australia in the three years ended June, 1940, appears to have averaged 164,000 tons per annum. The approximate consumption level for 1948-49 was 160,000 tons, which shows an actual decrease in consumption, although there was a big expansion in newspaper circulation. However, there has been an increasing usage (nearly 20,000 tons) of substitutes for newsprint, such as calendar paper, particularly in magazine printings.

The demand for newsprint comes from newspapers, magazines and the cheaper class of printed matter, with newspapers making up the major part of the demand. Increased population, the appearance of new papers and the increase in individual requirements with the high level of prosperity, have resulted in a big increase in the circulation of newspapers, but the effect of circulation on the demand for newsprint is conditioned by the size of the newspaper. Although increasing in size, newspapers are still much smaller than they were pre-war. Among the factors which operate to determine size are publishing costs and the demand for advertising space. Increased costs may make it necessary to economise in the use of newsprint, while a fall in advertising requirements would have the same effect.

It is estimated that there has been an increase of about 75 per cent. in newspaper circulation since 1939. This has not been noticeably reflected in the demand for newsprint because of the higher cost of newsprint and the diminished demand for advertising space. Advertising represents a big part of the income from newspaper publication, and the economics of publication call for a certain minimum ratio of advertising to news in order that the publication may be kept on a sound financial basis. It is, therefore, apparent that further demands on newsprint will depend to a great extent on the demand for advertising space. There has been a very substantial increase in the cost of paper space for advertising. This has been caused by the increase in newsprint cost and other cost increases, together with the considerably greater circulation of newspapers. A given area of space would now cost on an average 130 per cent. more than pre-war, although, of course, a much wider field is being reached with the higher circulation. At the present time, too, commerce is much less competitive than pre-war, and the call for advertising space is in general not nearly as great as pre-war; these factors are having a very restrictive effect on the demand for advertising space. This, of course, restricts the ability of newspaper publishers to provide general news service, and accentuates

the effect of the increased cost of these services above the pre-war level.

The price of newsprint has risen very steeply since 1939, when it was £17 per ton. It is now available at approximately £65/10/- per ton from Canada, but is subject to the operation of dollar quotas. Newsprint from Scandinavia and Finland is available at £48 per ton, while the price of newsprint from the United Kingdom is approximately £52/10/-. Australian newsprint is £47/10/- per ton, but at present, local supplies would not exceed 20 per cent. of the newsprint consumed. Owing to the dollar quotas restricting the import of Canadian newsprint, the import of Scandinavian newsprint has increased and is expected to represent about 40 per cent. of news-paper consumption for 1949.

Under existing conditions, the current demand for newsprint is estimated to be 170,000 tons per annum. Any marked increase in the demand for newsprint will probably come not so much from an increase in the circulation of newspapers as from an increase in the present size of papers, which would seem to depend on an increase in competitive trading and a fall in the price of newsprint. Trade is becoming more competitive, and there have already been substantial reductions in the price of overseas newsprint from non-dollar sources. On present indications, demand in the year 1950-51 might reach a level of about 185,000 tons.

## WRAPPING PAPER.

The demand for wrapping paper is particularly responsive to the changes in economic activity as it arises mainly from the demand for other goods. A substantial part of the demand comes from the manufacture of paper bags, which is estimated at 40 per cent. of the total demand for wrapping paper.

Although restrictions no longer exist on the use of wrapping paper, it would appear that some of the practices which were established when the restrictions operated are taking some time to disappear. With increasing competition it can be anticipated that these practices will finally disappear and new developments in wrapping requirements will add to the quantity now used.

Whilst in certain fields there are increasing demands for wrapping paper, as in the use of multi-wall bags for products such as cement, there is also a tendency for wrapping paper to be displaced by cartons for certain lines. Cartons of paper board are being used in increasing quantities as containers for products such as small hardware lines, e.g., locks, and bicycle and motor car accessories.

The consumption of wrapping paper for the three years ended June, 1939, is estimated to have averaged about 39,000 tons per annum, and it is estimated that the current demand for established usages is at the level of about 50,000 tons per annum. By 1952, this demand might be expected to rise to 56,000 tons. The use of this type of paper for multi-wall bags in the packing of sugar and other granular or powdery products, is expected to extend in the next few years.

There have been very substantial increases in the price of wrapping paper since 1938-39; a representative line shows an increase from £31/5/- to £83 per ton; i.e., by approximately 166 per cent. However, the demand for wrapping paper and paper bags is generally inelastic to changes in the price of paper alone, because in the main the cost of bags is very low in relation to the price of the article sold. Nevertheless, with some low priced bulky goods there is still some tendency to avoid using wrapping paper and paper bags.

## PAPER BOARDS.

Of the products dealt with in this review, the increase in demand for paper boards in comparison with 1938-39 is the most marked. The demand continues to increase fairly rapidly, as in addition to the increased demand resulting from general commercial development there have been substitution for other forms of containers and packaging, and ever increasing usages. Besides the wider use of paper board packages and containers for the carrying of frozen foods, fruits and numerous other commodities, particularly butter, there was a wartime development in the waterproofing and high wet strengthening of papers and boards for the manufacture of containers of all types which opened up further fields for use.

The shortage of timber for boxes and cases has resulted in many instances in the substitution of paper board packaging for wooden packing cases, and there is unlikely to be any marked reversal of this trend in the near future because of other heavy demands on the Australian timber industry.

In addition to the demand for paper board for containers and packages there is also a demand arising from the uses of paper board in the manufacture of building materials, and these uses are increasing.

(Turn to Page 126)





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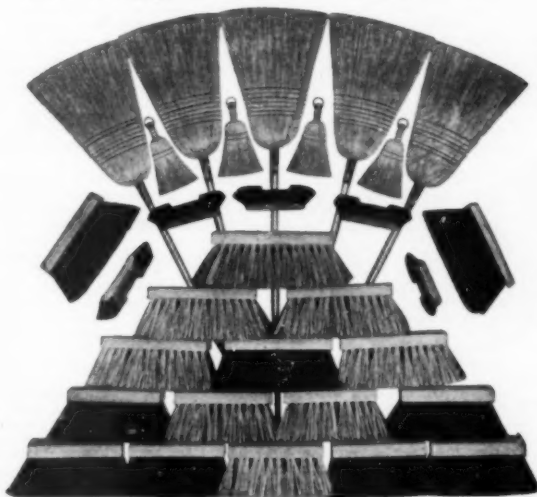
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The consumption of paper board for the year ended June, 1939, appears to have been about 66,000 tons, while at the present time the current demand for boards is estimated to be in the vicinity of 120,000 tons per annum. This demand may be expected to increase in future not only as a result of general commercial growth, but as already indicated, because of the development of new uses and expansion of existing uses for various types of board. The use of solid and corrugated fibre containers in packing has only been developed to a small extent in Australia by comparison with Canada and the United States of America.

It is estimated that the demand for boards will be 130,000 tons within the next twelve months. It is expected that paper board containers will still further replace wood and other containers in some fields.

Like wrapping paper the increase in the price of paper board has been very substantial, and a representative line shows an increase from £15/15/- to £40/10/- per ton, i.e., by approximately 157 per cent. The demand for paper board is generally inelastic to changes in the price of board. In many instances the paper board container or packaging is relatively a very small item of cost when taken in conjunction with the value of the commodity sold and it is usually essential for the sale of the goods.

#### FINE PRINTING, WRITING, TISSUE AND OTHER PAPERS.

Under this heading comes a wide variety of papers, the chief categories being printing, writing and tissue papers, with printing paper about 50 per cent. of the total consumption. Demand comes from magazines, educational works, novels, and other books, circulars, labels, leaflets, catalogues, commercial paper, writing tablets, envelopes, blotting paper, duplicating paper, toilet paper and stationery.

The major part of the demand comes from manufacturing stations and the printing industry. This demand has, to some extent, been restricted because of plant and labour factors, as the installation of new plant and post-war replacement have been much slower than could normally be expected because of the dollar shortage and reduced plant imports from the United Kingdom and the Continent. Although employment in these industries is at a higher level than in 1938-39, there is still a shortage of labour.

Having regard to these circumstances, present demand is probably 90,000 tons (including approximately 7,000 tons of tissue paper) and may be expected to rise to nearly 95,000 tons by 1952. Pre-war demand appears to have been about 70,000 tons per annum.

The price of printing papers has increased by about 150 per cent. for Australian paper and by about 182 per cent. for imported paper since 1938-39. In the same period, writing paper has increased by about 134 per cent. for Australian, and by about 156 per cent. for imported paper. The reaction of demand for the varied group of printing, writing, tissue and other papers to price changes would vary with the type and use of the paper. For instance, the quantity of printing paper required would be considerably affected by price changes, but such would not be the case with writing paper. In any case, variations are more likely to result from changes in the general level of prosperity than from changes in the price of paper.

#### NEWSPRINT SUPPLY.

Australian production of newsprint is at present at the rate of approximately 32,000 tons per annum against the total estimated demand of about 160,000 tons for 1949.

The following table gives particulars of imports and local production of newsprint for 1938-39, 1946-47, 1947-48 and 1948-49.

Newsprint.				
	1938-39	1946-47	1947-48	1948-49
Import, tons	178,007	163,341	117,383	95,455
Australian production, tons	Nil	31,734	31,335	30,700

Plans are in hand to expand production in Australia to a rate of 80,000 tons per annum, and it is anticipated that this figure will be reached within the next twelve months. At present three shifts are being worked on a seven day week basis, and further increase in production is dependent upon the operation of additional plant and machinery, but progress is being retarded by delays in the construction of buildings.

Current Australian production is only 20 per cent. of current demand, and even with the projected increase in production it is doubtful whether Australian supplies will exceed 40 per cent. of the total demand, thus leaving a big proportion of Australian requirements which it will be necessary to import.

#### WRAPPING PAPER OUTPUT.

Present output of Australian factories is about 38,000 tons of wrapping paper per annum. The latest available import figure is 18,000 tons for 1948-49. Excluding stocks, the available supplies of wrapping paper such as kraft, vegetable parchment, and grease-proof in Australia during the years 1934-35 to 1948-49 are shown in the table hereunder:

#### 1939-40 to 1948-49 — tons.

Year	Imports	Local Production	Total
1939-40	10,000	34,000	44,000
1940-41	4,000	41,000	45,000
1941-42	2,000	43,000	45,000
1942-43	1,000	40,000	41,000
1943-44	3,000	41,000	44,000
1944-45	2,000	45,000	47,000
1945-46	3,000	41,000	44,000
1946-47	6,000	32,000	38,000
1947-48*	21,000	38,000	59,000
1948-49*	18,000	38,000	56,000

\* Estimated.

As the above figures show, the major part of wrapping paper used during recent years has been produced in Australia. This is particularly the case with kraft wrapping paper, and the above import figures include mainly other types which are not at present produced in Australia.

Planned production for 1952 is about 70,000 tons per annum, against a current estimated demand for established usages of about 50,000 tons per annum, which might be expected to rise to about 56,000 tons by 1952. These estimates, however, do not take into account the potential field of usage for these types of paper for industrial containers which may develop in the next few years, such as the increased usage of multi-wall bags. The use of this type of bag for sugar is an example of the possible field for development.

The indications are that there are many avenues of usage to be exploited, and it is anticipated that all available local production will be absorbed.

#### OUTPUT OF PAPER BOARDS.

Current Australian output is about 84,000 tons per annum. Precise information concerning the planned output of board in the case of all producers is not available, but it seems likely to be in the vicinity of 120,000 tons, and includes the projected output from new mills which are to be established as well as those already in the field. The current estimated demand for established usages is about 120,000 tons, and this is expected to rise to 130,000 tons within the next twelve months.

The available supplies of board during the years 1938-39 to 1948-49, excluding stocks, are shown in the table hereunder:

#### Boards.

Year	Imports—tons	Local Production—tons
1938-39	11,225	54,906
1939-40	9,429	67,595
1940-41	4,734	62,339
1941-42	2,384	61,816
1942-43	770	70,246
1943-44	1,869	71,601
1944-45	2,548	69,856
1945-46	1,217	71,909
1946-47	5,559	70,613
1947-48	23,740	83,184
1948-49*	23,602	84,000

\* Estimated.

Paper boards are similar to wrapping paper inasmuch as the major part of supplies is produced in Australia. It is anticipated that the expansion of local production will be to some extent at the expense of imports, but greater supplies of paper board will be necessary to meet new uses and the expansion of existing uses for the varying types of board which are expected to arise in the near future.

#### SUPPLIES OF FINE WRITING, PRINTING, TISSUE AND OTHER PAPER.

The present Australian production of paper under this heading is estimated to be at the rate of 53,000 tons per annum and covers a very wide range of paper.

The following table gives figures based on published statistics and information from trade sources of imports and local production for 1938-39, 1946-47 and 1947-48.

#### Writing, Printing, Tissue and Other Papers.

	1938-39	1946-47	1947-48
Imports, tons	55,844	32,735	70,731
Australian production, tons	13,000	45,971	40,189
Total	68,844	78,706	110,920

Further expansion is taking place which is expected to increase local production to 64,000 tons per annum within the next twelve months, and to 84,000 tons per annum by 1952, against a current estimated demand for established usages of about 90,000 tons per annum, which might be expected to rise to 95,000 tons by 1952.

Many kinds of paper are involved in this group of papers; and some of them are not produced in Australia because they are of a specialised type or would not give an economic throughput. Of the kinds of paper which are produced here, planned production is below the estimated total demand. The demand for any one kind of this group of paper is relatively small and would be well within the productive capacity of the plant used. This means that while overall production will be below the Australian demand of this group, the supply of any one kind of paper will depend upon the allocation of plant as between the various lines that make up the total demand.

#### PULP.

The wood pulp used by the Australian paper industry is both imported and produced in Australia. The long fibre wood pulp from softwood trees comes from the Scandinavian countries, United States and Canada, with a relatively small quantity produced in Australia from softwood trees grown in local pine plantations. However, it is the short fibre wood pulp produced from Australian eucalypts that forms the basis of the Australian industry.

The major part of the pulp used is produced from native timber. The imported pulp which gives greater tear strength to the paper because of its longer fibre is used for mixing, and as tear strength is not an essential with some types of paper there is considerable variation in the quantity of imported pulp which is mixed with the Australian pulp.

In all the pulping mills in Australia, there is a continuous flow of production from pulp to paper, but one of the mills also produces some pulp for use by other mills controlled by the same Company.

#### LABOUR.

Employment in the industry during recent years is shown by the following figures published by the Commonwealth Bureau of Census and Statistics under the heading, "Paper Making," which describes the industry as defined for the purposes of this review.

	Males	Females	Total	Percentage of 1938-39
1938-39 (average)	1,706	255	1,961	100
1944-45 (average)	3,956	669	4,625	231
June, 1946	4,521	486	5,007	255
June, 1947	4,785	465	5,250	268
June, 1948*	5,246	537	5,783	295
December, 1948*	5,487	562	6,049	308
March, 1949*	5,601	532	6,133	313

\* Provisional.

It will be seen that the number of females in the industry has not increased as rapidly as the total number employed. In 1938-39 females were 13 per cent. of the total, and though the proportion increased during the war it had decreased to 9 per cent. in December, 1948, while over the same period the proportion of females to the total number of wage and salary earners in civil employment in Australia increased from 25 to 28 per cent. The decrease is apparently due to the higher proportion of males employed in the pulp plants established during and since the war. It is estimated by the Commonwealth Employment Service that about 8 per cent. of the workers are juveniles.

(Turn to Page 128)



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## RAW MATERIALS.

Although pulp can be made from any form of plant life, it is with wood pulp that the paper industry is mostly concerned. In addition to wood pulp there are pulps made from jute, hemp, bamboo, straw, bagasse, esparto grass, cotton and flax.

The most suitable indigenous timber for the production of paper pulp is found in the eucalypts of South Eastern Australia and Tasmania, such as mountain ash or swamp gum, silvertop or coast ash, alpine ash, messmate, stringybark. An exotic timber Monterey Pine (*Pinus radiata*) has been extensively planted throughout Australia, particularly in South Australia, and is used for the production of pulp, but the quantity available is relatively small compared with total pulping requirements.

In the production of groundwood pulp for newsprint mountain ash (*E. regnans*) is mainly used. The only stand of this species of sufficient size, quality and suitable location is in Tasmania. The forest resources of mountain ash are limited, and it is probable that the planned production of 80,000 tons of newsprint per annum will require most of the available timber of this species.

Further expansion of the newsprint industry beyond that already planned appears, therefore, to depend upon the suitability of some species other than *E. regnans* for the production of groundwood pulp.

## STRUCTURE OF INDUSTRY.

Factors which have an important bearing on the location of the pulp and paper industry are:—

1. Proximity of Forests.
2. Water Supplies.
3. Fuel and Power.
4. Arrangements for disposal of effluent.

For the production of paper pulp, the industry requires large quantities of timber, and as it takes as much as, and at times more than three tons of wood to produce one ton of pulp, the location of the pulp mill in a central position and reasonably close to the forests is a major consideration.

The water consumption is enormous, with the fresh water requirements for paper varying from about 80 tons of water per ton of mechanical pulp to 140-400 tons per ton of chemical pulp, and although the water is handled again and again, losses are inevitable. As a result the availability of river water has had an important bearing on the location of the mills.

Pulp and paper making calls for the expenditure of a great deal of energy in the form of steam and electricity, and fuel consumption is very high. Cheap electric power and the proximity of coal supplies are, therefore, advantageous, but do not exert as big an influence on location as the factors already named, and wood is sometimes used for fuel in place of coal. In recent years the uncertain deliveries of black coal have forced some mainland mills to use alternative fuels such as brown coal, but this has been done with considerable inconvenience.

Chemical pulping mills are equipped with chemical recovery plants, and the effluent is, therefore, a weak wash water only. It is desirable, however, that the mill location be such that ample water is available, and that adequate facilities exist for the disposal of the voluminous effluent.

In some mills the pulp and paper making is integrated and the manufacture of the pulp and paper is a continuous process. However, there are paper and board mills which are separate from the production of pulp. These mills draw on the pulp mill for supplies which are mixed with imported pulp in the manufacture of paper or board. Where paper and board making are separated from the production of pulp, the question of forest location does not arise, and these mills are operating in capital cities and suburban areas.

There is a tendency for the mills to specialise as between paper and paper board and also in the types of paper produced, this depending on the type of machine used and the process used in the production of the pulp. There are four well defined sections of the industry as below, and, with the exception of paper board, the industry generally can not be regarded as competitive in Australia. In order of establishment these sections are:—

1. Paper Board.
2. Wrapping (or Kraft) Paper.
3. Fine Writings and Printings.
4. Newsprint.

## LOCATION OF PLANTS.

The following schedule gives the name, location and type of product of each Australian manufacturer in the pulp and paper industry:—

Manufacturer.	Location.	Type of Product.
Australian Newsprint Mills Ltd.	Boyer, Tasmania.	Pulp and newsprint (pulp for own use).
Australian Paper Manufacturers Ltd.	Head Office, Melbourne.	
	Mills:	
	(a) Maryvale, Vic.	Pulp & wrapping paper.
	(b) Fairfield, Vic.	Wrapping paper, paper board, printing paper.
	(c) Sth. Melbourne.	Paper board and paper felt and specialty papers.
	(d) Broadford Vic.	Straw board and chip board.
	(e) Botany, N.S.W.	Paper board, printing paper, wrapping paper.
Associated Pulp and Paper Mills Ltd.	Burnie, Tasmania.	Pulp and fine printing and writing paper (pulp for own use).
Bernard Lawrence Pty. Ltd.	Alexandria, N.S.W.	Paper board.
Cardboards Pty. Ltd.	Brisbane.	Paper board.
Cellulose Aust. Ltd.	Millicent, Sth. Aust.	Pulp and paper board (pulp for own use).
Ernest Nelson Pty. Ltd.	Footscray, Victoria.	Paper board.
Western Paper Mills	Baywater, W. Aust.	Paper board.

In addition to the above established manufacturers, mills for the following companies are in the course of construction:—

Manufacturer.	Location.	Type of Product.
Thomas Owen & Co. (Aust.) Ltd.	Burnie, Tasmania.	Vegetable parchments, greaseproofs and glassines.

Murray Valley Mills Ltd. — Albury, N.S.W.

Tasmanian Board Mills Ltd. — Launceston, Tasmania.

Rag paper.

Pulp & container board (pulp for own use).

## RESEARCH.

Prior to the establishment of the pulping industry in Australia, the view had been held by many experts that the production of suitable pulp from Australian eucalypts was impracticable, and it was only after extensive research that the suitability of the native timbers was established.

Although the industry is now well established in Australia, research continues to play a very important part in its further development, and all the major companies have their own well-equipped research staffs. In addition, a co-operative research programme is operated by the three major companies and the Division of Forest Products of Commonwealth Scientific and Industrial Research Organisation. The companies subsidise the work of the Division, whose activities are largely in the fundamental field. The work being done is of interest to all companies engaged in the industry in Australia. With the decline in overseas prices and the increasing competition of imported pulp and paper, the possibility of lowering costs in the industry will be an important consideration and will depend to a great extent on research activities. Increased pulp yield, greater machine output, fuel economy and improved methods of chemical recovery, are some of the matters in which research will no doubt make valuable contributions towards ensuring continued stability of the industry in Australia.

An important contribution was made to research activities with the recent visit to Australia of Dr. Jayme, of Darmstadt, Germany, an authority on cellulose chemistry, whose visit was arranged by the Commonwealth Government in conjunction with three of the paper companies.

The industry also has a Pulp and Paper Technical Association through which many of the results of research activities are made available to the industry. The Association held its third conference in Sydney in April, 1949, when twenty-one papers were presented dealing with both technical and practical aspects of the industry, by people associated with Australian and New Zealand paper companies and officers of the Division of Forest Products, of Commonwealth Scientific and Industrial Research Organisation.

## GENERAL OBSERVATIONS.

The Australian Pulp, Paper and Paper Board Industry has become an industry of major importance to the Australian economy. Pioneer research by Australian scientists, coupled with industrial initiative and enterprise, have put our natural resources to a new industrial use.

The industry has reached a level of activity considerably in excess of that of 1938-39, and is still expanding. Planned developments will nearly double the present production volume in a few years.

It is likely that in the near future the industry will be in a position to meet the major part of Australian requirements of paper-board and of paper, other than newsprint.

Production of newsprint is at present at the rate of about 32,000 tons per annum, and this is expected to rise to 80,000 tons within the next twelve months, which, however, will still be less than 40 per cent. of the total estimated demand. There is, therefore, considerable scope for development in this field.

It seems, however, that production of newsprint in Tasmania will be limited to a maximum of 80,000 tons per annum in view of the available timber resources. At present, mountain ash or *E. regnans* is used for the manufacture of pulp for newsprint, but stands of this species of timber are limited, and further extension will depend to a great extent upon the suitability of other available species.

The projected expansion in production of wrapping paper from 38,000 to 70,000 tons, and boards from 84,000 tons to 120,000 tons will more than satisfy present demand, and it will have to be matched by the expansion of existing usages and the development of new usages. As many well-known fields of packaging have only been developed to a limited extent in Australia by comparison with Canada and the United States, it is not anticipated that there will be any difficulty in the absorption of supplies.

Development in the production of fine writing, printing, and other paper has been rapid since 1938-39 and much of this output covers an entirely new field. In 1938-39 the estimated Australian production was 13,000 tons. Production is estimated at 53,000 tons for 1949, and it is expected to reach a rate of 84,000 tons per annum by 1952. As planned production for these kinds of paper is below the total estimated demand, the absorption of output appears to be assured.

With the development of the industry in Australia, increased quantities of imported long fibre pulp will be required for mixing with the Australian pulp; and in view of the dollar shortages, Australia will have to look increasingly to non-dollar sources of supply.

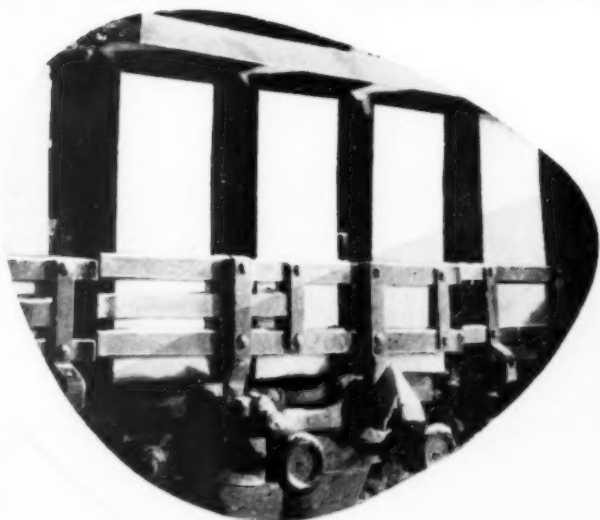
The industry is involved in continuous processes in the main, working the round of the clock on at least a five-day week, and in some cases additional time is worked over the week-end by the payment of overtime or employment of additional shift workers. Increased capacity can, therefore, be regarded as mainly dependent on the further expansion of plant and equipment, which is at present taking place.

Imports are tending to become competitive where the local paper and board contains a relatively high percentage of imported pulp, but otherwise the paper and board produced in Australia has a competitive advantage over imports. However, as costs of Australian paper are continuing to increase while overseas prices are falling, the competitive advantage is gradually being narrowed.

There is at present no acute shortage of paper and paper board, and in some types of paper there is evidence of ample supply. There is, however, an unsatisfied demand for the Australian product because of the lower prices, and supplies are being rationed by some manufacturers.

The industry is now well established in Australia on a large scale, and with further extensions will be in a position to give a very substantial amount of protection against any possible interruption of supplies. The plant and equipment is mostly modern and, providing increased costs of production can be contained, the industry should be in a position to continue to compete successfully with the imported paper and board, and to ensure a high degree of stability.





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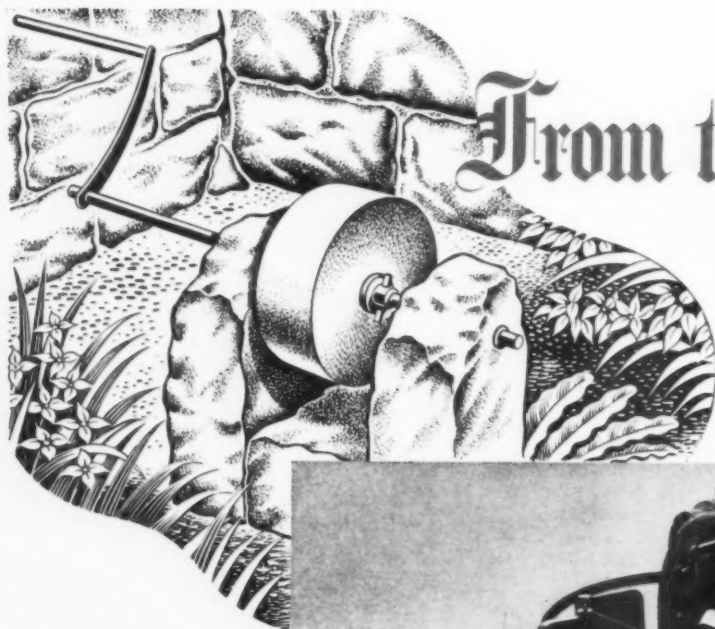
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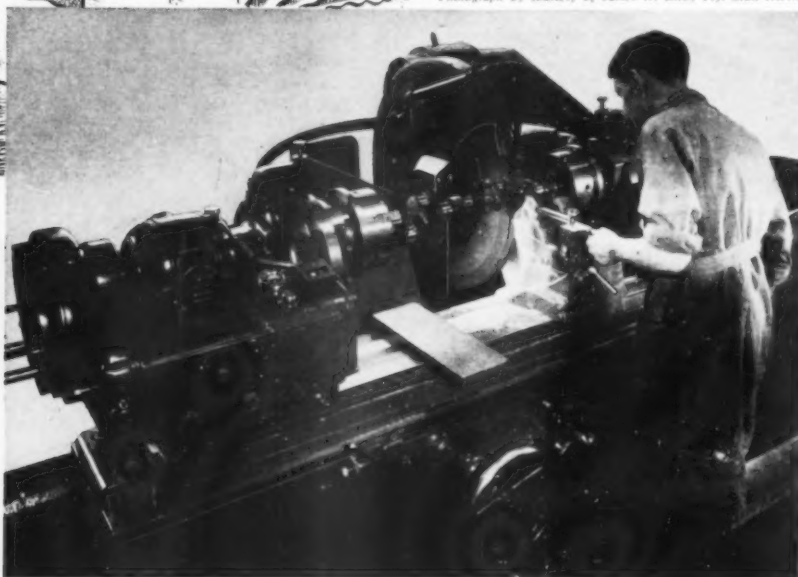


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## WEALTH FROM THE SNOWY

This article has been prepared by the Department of Information, at the request of the Minister for Works and Housing, to show the possibilities of the huge power and irrigation development by the use of the waters of the Snowy Mountains area.

TO most Australians, the waste of the water from the melting snows of the Alps means so much water lost to the "land." They think of it in terms of fewer orchards, fewer fat lambs, less cereals. History has taught them to regard water as something to drink, to make things grow, to wash in. In places like Canada and Sweden, however, water has an entirely different significance. To the people of those countries it means so much horse-power.

The Australian attitude is a natural one in a land of "droughts and flooding rains," but in the middle of the twentieth century it is a lop-sided and an out-dated one. In the future, Australians must regard their waters as having a twofold purpose—to promote greater and better primary production and to supply power for secondary production.

It is obvious, then, that, in this age, power—and power alone—can make a country great. Australia is power hungry. Every possible means of producing this "most efficient tool of the machine age" must be exploited here. At present, most of the power used in this country comes from black and brown coal mines, and in the future these mines will continue to be the major providers. But the strain on them can be lessened and their power output vastly complemented if the hydro-electric potentialities of Australia are fully developed. For this reason, the melting snows of the Alps are of a tremendous importance to the future industrial development of this country.

The Snowy Mountains Hydro-Electric project was officially opened by the Governor-General of Australia, Mr. W. J. McKell, at Adaminaby, on October 17th, 1949.

Water and power are of the utmost significance to this country. The potential value of this scheme to the national economy is fully discussed in this D.O.I. review of what led up to and what is planned for the future.

WHEN the prodigal Snowy and other rivers of the Australian Alps are harnessed to serve man, it has been estimated that their waters will be capable of generating no less than 1,720,000 kilowatts of hydro-electric power. When it is realised that the average householder in Australia uses about one-fifth of a kilowatt for domestic purposes each year, some idea of the immensity of this power production is gained. Or perhaps a better appreciation can be had if a comparison is made with coal. 1,720,000 kilowatts of power means as much to industry as four million tons of black coal per year, which is just a third of the present annual black coal output of Australia. The hydro-electric potential of the fast flowing rivers which stem from Kosciusko and its neighbouring peaks are capable of producing four times as much power as the present total generative capacity of the State Electricity Commission of Victoria.

No other form of power possesses the same qualities as that which is generated by water. Water power is not exhausted by use. As well as being non-diminishing, its cost is lower than any other form. Once the dams and tunnels have been constructed, they will be there forever, for they can never be superseded, never be outdated. Even when—and it would seem that the day is still far off—atomic energy is developed for commercial use, authorities consider that hydro-electric installations will not be discarded. It is difficult to envisage the elaborate plant which would be necessary for the production of atomic power, but even the steam turbine engine is a complicated and delicate unit when compared with the plant needed for the generation of water power. Rugged and reliable, these simple plants require the minimum amount of maintenance and are capable of meeting immediate demands for power.

The official Canadian attitude towards hydro-electric power is summed up in two sentences: "Low-cost power is the key to industrial supremacy. Water power is Canada's basic power tool." The intelligent use of that basic power tool has made Canada one of the greatest industrial nations in the world. Water supplies two-thirds

of the power needed by those industries and has made it possible for her to produce 40 per cent. of the world's paper pulp. In addition, according to a Government report, "low cost hydro-electric energy has brought entirely new Canadian communities into existence." There is no reason why Australia should not be able to do the same. If the waters of the Australian Alps are utilised to their fullest extent, it is easy to envisage a Quebec arising in the south-eastern corner of our Continent, for low-cost power made available inland can become the greatest stimulant to the de-centralising of industry. At the present time Australian industries are crowded on the coast because our main power stations are located there. Power is cheaper if it is consumed as close as possible to the point from which it is generated. For this reason, north-eastern Victoria and south-eastern New South Wales could become great industrial areas if power were available from the head waters of the Snowy and other alpine streams.

Such de-centralisation would have a twofold effect. In the first place, it would relieve the overcrowding of our cities and prevent the inevitable evils which accompany such conditions. Secondly, and perhaps a much more important consideration, is the effect de-centralisation will have on the defence of Australia. As it was previously stated, at the present time most of our key industries and munition factories are established close to the coast because of the ready access to power and to overcome transport difficulties. For this reason, industrial plants would make easy targets for bombing in time of war. With the large quantities of reliable power made

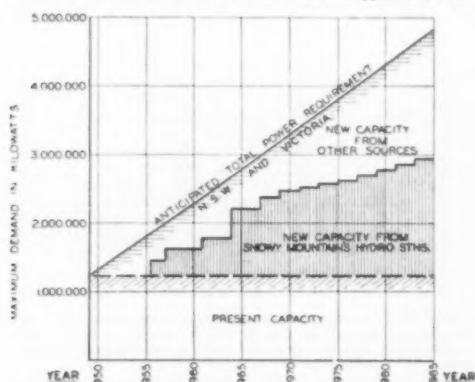


Fig. 1. Diagram showing anticipated power demands and share to be taken by proposed hydro-electric stations.

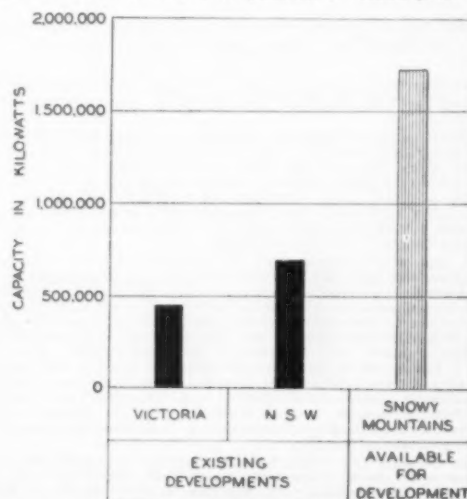


Fig. 2. Power available from Snowy Mountains comparison with existing developments.



available by the Alps scheme, however, it would be possible to develop key industries and carry out defence research works requiring considerable power in an area that would be far less vulnerable to any enemy attacks.

Apart from the de-centralisation aspect, however, hydro-electric generation possesses other outstanding qualities from a defence angle. A full war effort calls for abnormal power requirements and to meet such requirements, more coal is needed, additional transport facilities to move that coal are necessary. This means additional labour at a time when manpower is short. With hydro-electric generation on the other hand a minimum amount of labour is required to operate stations. In addition, such stations would be mostly underground and so effectively protected from bombing. No conspicuous chimney stacks rise from hydro stations, either, and hence no smoke—factors which make them easier to camouflage.

This, then, is the great potential which awaits development on the snow fields of Kosciusko and the other mountains of the Alps. This great reservoir which will water the land as it serves industry! For the waters of the Alps which will light and heat private homes and set in motion the wheels of the factories will be used for filling the channels of new irrigation settlements to provide more food for a hungry world.

Probably the first man to realise some of the value of the waters of the Snowy was a Jindabyne citizen who used the current of the river to drive the wheel of his flour mill nearly a century ago. But apart from this minor interference, no man thought of seriously interrupting that current until the 'eighties of the last century. Actually it was not until recent years that the real potential of the river has been appreciated. Although various schemes for harnessing the Snowy were brought forward between the years 1884 and 1946, most of them were limited by the sectional outlook of their advocates. It was not until recent years that men began to recog-



Relief map of areas concerned in the proposals. Tunnels shown by dotted lines. Power stations shown by white dots.

nise the fact that its waters were doubly valuable in that they could be used for both irrigation and the production of hydro-electric power.

Throughout the 'eighties, 'nineties and on until after Federation, spasmodic considerations were given to proposals to divert the Snowy to the Murrumbidgee across the Dividing Range. Such proposals received most attention during drought seasons, but, when seasons of plenty came, men were apt to forget about them. None of the early schemes included dam construction, and it was not until the post 1914-18 war years that the utilisation of the waters for power production was even contemplated.

It was after extensive surveys which were carried out between the years 1915 and 1918 that the Public Works Department of New South Wales considered a project for using the waters of the Snowy for the generation of additional electricity for the City of Sydney and for use in the south-eastern corner of the State. This project ignored the irrigation aspect, and was concerned solely with the production of power. The idea was to take advantage of the 80-mile loop of the Snowy so that its water would be diverted from one section of the river into another through pipes, tunnels and turbines. The ultimate power output possible from the scheme was estimated at 150,000 kilowatts. Though it did not pass the blue-print stage, this proposal was important inasmuch as it directed attention to the power potential of the river.

In the early and middle twenties, schemes for ending the wastefulness of the Snowy became more ambitious, but, in the main, they were primarily concerned with supplying water to the City of Sydney and other centres, which lay between the capital and the Snowy area. An unreliable city water supply set people thinking about the construction of tunnels and pipelines which would bring the Snowy

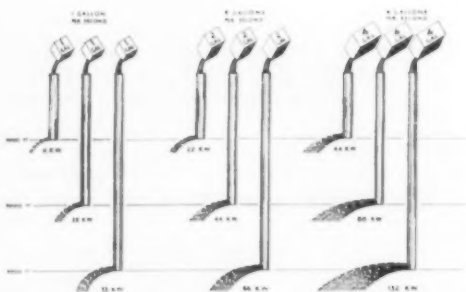


Fig. 3. Illustration of water power. 1 KW is 1 Kilowatt, equals 1,000 watts. 1 KW equals approximately  $1\frac{1}{2}$  horsepower. The flow of the Snowy River at Jindabyne averages 8,050 gallons per second.

waters on to the lawns, and into the sinks and baths of the homes of Sydney's suburban dwellers. At the same time primary producers of the dusty settlements westward from the mountains had ideas of bringing the same water to their holdings. Some of the plans put forward at this stage included the installation of minor power stations, but still the emphasis was on irrigation.

When, in 1937, two Swedish engineers revived, with elaborations, the hydro-power scheme considered by the Public Works Department of New South Wales in 1920, interest in the Snowy as a power provider was again aroused. Whereas in 1920 it was thought possible to produce 150,000 kilowatts, the 1937 report claimed that 250,000 were available.

In 1940, Victorian authorities claimed the right to a voice in any discussions regarding the fate of the Snowy waters, and at about the same time, the Commonwealth Government showed that it, too, was interested in any decisions made. The Commonwealth Government had certain rights to the waters under the terms of the agreement between the Commonwealth and the parent State in relation to the surrender of the Territory for the Seat of Government. This agreement had been ratified by the "Seat of Government Surrender Act, 1909" of New South Wales and the "Seat of Government Acceptance Act" by the Commonwealth. Clause 10 of this agreement reads: "The State shall grant to the Commonwealth without payment thereof the right to use the waters of the Snowy River and such other rivers as may be agreed upon, or in default of agreement may be determined by arbitration, for the generation of electricity for the purposes of the Territory, and to construct the works necessary for that purpose, and to conduct the electricity so generated to the Territory." From this, it was clear that no scheme which ignored the needs of the Federal Territory could be developed. It would appear that the men who planned Federation had possessed great foresight.

In 1944 a report was made by a special committee appointed by the Government of New South Wales to investigate the "utilisation of the waters of the Snowy River." This stressed the need for the diversion of the waters inland to the Murrumbidgee Valley for irrigation, and in so doing, clearly demonstrated the outstanding benefits to the land from such a scheme. The committee's proposal did not provide for any appreciable hydro-electrical development.

In 1946, Ministers of the Commonwealth, New South Wales and Victoria, together with their technical advisers, met to discuss the future of the Snowy. For the first time in history, the waters of the river were discussed from an Interstate and National aspect, and, in addition, their complete usage for both power and irrigation was examined. The New South Wales representatives at the conference strongly advocated the use of the waters for irrigation by diverting the Snowy into the Murrumbidgee. Victorian representatives felt that the diversion to the Murray could provide much power in addition to water for irrigation. They advocated diversion to the Murray River in such a way that 700,000 kilowatts of hydro-electric power could be available.

The important conference ended with an agreement that an investigation should be carried out by the Commonwealth into the two proposals. The engineering aspects of the scheme were made the responsibility of the Department of Works and Housing, and the agricultural and economic aspects were handled by the Department

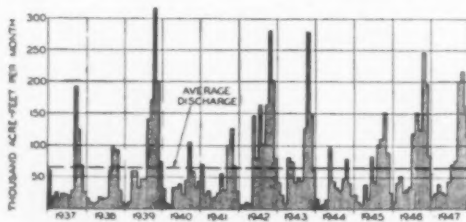


Fig. 4. Diagram of discharge, Snowy River, at Jindabyne.

of Post-War Reconstruction. Both Departments were assisted in their investigations by the Victorian and New South Wales State Governments and by experts from other Commonwealth Departments.

The result of this initial Commonwealth enquiry showed that the proposed diversion of the Snowy to the Murray was not only practicable, but, in addition, was extremely attractive, from a power point of view.



From the preliminary and conservative figures it appeared that there was a monetary advantage in the Murray proposals which could be capitalised at over £40,000,000.

The agricultural and economic investigation, however, found that, from the point of view of irrigation, there was some advantage in the scheme to divert the waters to the Murrumbidgee Valley.

A Premiers' Conference in 1947 considered the power and irrigation report and recommended a fuller investigation. For this purpose, a technical committee, with representatives from the Commonwealth, New South Wales and Victoria, was set up. The function of this technical committee was to obtain the necessary information so that a decision could be made as to which of the rival schemes—

- (a) diversion of the Snowy to the Murray; or
  - (b) diversion of the Snowy to the Murrumbidgee,
- should be proceeded with.

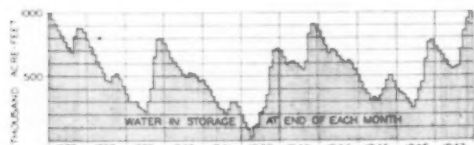


Fig. 5. Diagram of storage behaviour Snowy River regulated to even discharge.

The Committee extended its investigations to cover the whole Snowy mountains area with the aid of aerial photographs of areas not previously adequately mapped and made its report available in November, 1948. In that report, it was shown that the potential of the waters of the Snowy Mountains area was immeasurably greater than ever before appreciated.

#### THE INVESTIGATION.

The investigation to determine the merits of the proposal to divert the Snowy waters into the Murray River, carried out by the Committee set up by the Commonwealth Government in 1946, can be said to have brought about an entirely new concept of the value of the waters in the Alps area. It would be safe to say that not until 1946 was the real significance of the Snowy River realised. It is, therefore, necessary to fully examine the investigations which have been carried on from then until the present day.

They might be divided into two sections. First, there was the determination of the practicability of the Murray diversion proposals, and, secondly, the more comprehensive investigations which grew out of this original task. This fuller investigation consisted of a straight-out examination of both the diversion of the Snowy to the Murray and the diversion to the Murrumbidgee, and of an intensive study of the best use of the waters of the whole Snowy Mountains area.

However, before the extent of the investigations can be appreciated it is necessary to obtain a clear picture of the requirements for hydro-electric schemes and what information the engineers of such schemes need before development can take place.

Water power is dependent on two factors. These factors are water quantity and height. If the quantity of water passing through a station is doubled, the power obtained is doubled. In the same way if the height or fall—the correct term is “head”—over which the water is used is doubled, the power is doubled. (See fig. 3).

The Australian Alps, therefore, are important from the point of view of power because of the heavy falls of rain and snow and because of the high altitudes at which these falls occur. Thus abundant water and high “heads” are available and both power producing factors are very good. To take advantage of these factors, however, it is necessary to have low-lying land adjacent to the heights. Fortunately the country drops away very steeply to the west of the mountains and power can be readily developed down to 1,000 feet above sea-level.

Although the natural reservoir of snow and the thick carpet of moss and humus keep the rivers of the mountains continually flowing, it does not necessarily follow that they maintain a steady flow throughout the winter and the summer. To get the most value from the rivers, man must regulate them. A glance at fig. 4 illustrates the variations in the flow of the Snowy River. The dashed line running across the diagram shows the average discharge. It will be seen that in some summer months the flow was only one-tenth of the average, and in one spring month it was nearly five times the average. It is, therefore, obvious that artificial storage of the Snowy waters is essential if reasonable use is to be made of them.

An examination of fig. 5 will show how such storage would be regulated. It can be readily seen how water would be drawn from storage in dry periods and returned to storage in months of high yield. The units used in this study are “acre-feet,” an acre-foot being the quantity of water needed to cover an area of one acre to a depth of one foot. The average discharge of the Snowy River for the 11-year period illustrated was 800,000 acre feet per year. It can be seen from the diagram that to regulate this discharge to an even amount each month a dam with a storage capacity of 1,000,000 acre feet would be necessary. An impression of the size of such a dam can be gained when it is realised that the capacity of the Hume Dam is 1,250,000 acre feet. It would be a dam at a high level to allow for the regulation of the flow of water for the power requirements of the hydro-electric stations.

The harnessing of water for power requirements in mountain areas presents fewer problems than the controlling of waters in such areas for irrigation. As well as this a far greater proportion of the water can be used. Whereas nearly 100 per cent. of the water from a river can be used for power production, only 75 to 80 per cent. of it would be available for final regulation for irrigation needs.

Various factors contribute to this loss of water made available for irrigation. The provision of storages and the degree of regulation which may be obtained for sites at lower levels and in drier and hotter areas is somewhat different from storages in the mountains.

By the time rivers have reached the plains they have lost a considerable amount of their vigour and tend to become more erratic in their behaviour. There are long periods, often running into years, when their discharges are well below the average. Also, where artificial storages are provided, there are appreciable losses by evaporation because of the large expanse of water exposed in the dams.

For these reasons it is impossible to get 100 per cent. usage of rivers. The proportions of water which may be usable for various volumes of storage can be seen diagrammatically in fig. 6. You will notice the sharp rise in the curve, which indicates the possible cost of obtaining extra water, as the storage volume increases. Just how soon an economic limit of development will be reached can be readily appreciated.

The process of obtaining controlled water from a river may be likened to the squeezing of juice from a lemon. A considerable portion of the total fluid available is readily obtained from the early and relatively easy squeezing, but as greater quantities of juice are required, more and more effort must be devoted to the squeezing, and it becomes almost impossible to extract the last drops, no matter how great the effort.

Therefore, it is apparent that there is an economic limit to the use of waters solely for irrigation purposes. It is worth remarking, too, that in seasons of flood, water is generally not required on the land and is, therefore, lost. With hydro-electric development, however, which will work in conjunction with steam stations, these excessive flood waters can be used to lessen the load on the steam plants by making power, additional to the normal output, available.

The investigators of the Snowy Mountains area were convinced that to get the maximum benefits from controlling the rivers, the waters should first be used for the production of power and then for irrigation requirements.

Their work, however, did not merely consist of gathering data for this major investigation. As well, they were called on to stimulate a greater realisation of the requirements and possibilities of hydro-electric development. The fact that to-day there is a greater appreciation of the advantages and value of hydro-electric power, and the economics of its development, as well as a greater tendency to view proposals from a national angle, demonstrates the degree of success they achieved.

Other benefits derived from the investigations were less obvious, but, nevertheless, invaluable.

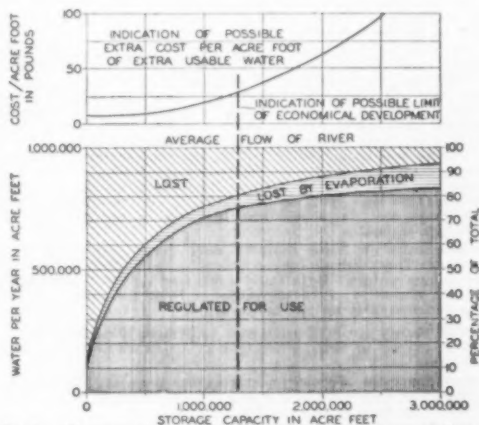


Fig. 6. Diagram of a typical storage, illustrating proportion of river water made available for irrigation.

From consideration of the fundamental requirements for hydro-electric power, it will be seen that the major part of work was concerned with determining levels and the water available at various points on the higher part of the mountain catchments.

The maps of the district, although they gave a reasonably accurate indication of the position of the rivers and mountains, gave no accurate indication of the levels. For this reason it was necessary to initiate a vast survey and mapping programme. This programme has not yet been completed, but accurate levels have been established where required for the various schemes. In addition, a great number of extra gauging stations have been established in order to obtain information regarding the flows in the upper reaches of the mountain rivers. In order to be able to make reasonably accurate assessments of the water available for various power stations, a major task confronted the investigators in the examination of existing data and the obtaining of new information on water flows.

Before the investigation was commenced in 1946, there were two schools of thought on the methods of getting the most value from the waters of the Snowy River. One school insisted that they should be used primarily for irrigation, and that irrigation requirements would be best served if all the waters were diverted into the Murrumbidgee River. The other school advocated power production, and claimed that most benefit would be obtained if all the waters were diverted into the Murray River.

When the investigation committee studied the power possibilities they realised that any scheme which confined itself to the Snowy alone would be an incomplete one. Whatever scheme they put forward would have to fit into an ultimate project for power development from the whole of this unique and valuable portion of Australia.

The whole Snowy Mountains area offers only two sites where major storages could be constructed. These are located on the Snowy River at Jindabyne and on the Eucumbene River near Adamabyne. Any power schemes must necessarily be based on these storages.





From the beginning the development of power from the Snowy River was dependent on the use of the Jindabyne storage. A further storage would be required, however, if the ultimate development of power from the whole of the Alps area was to be achieved. For this reason it would be necessary to use the attractive dam site at Adaminaby.

Though the Adaminaby storage is in the Snowy catchment area, it was found desirable to use it for the regulation of other rivers on whose catchments no major storages were available. Thus Adaminaby had an important bearing on the plans for the best utilisation of the waters of the Snowy Mountains. Its selection as a storage led to

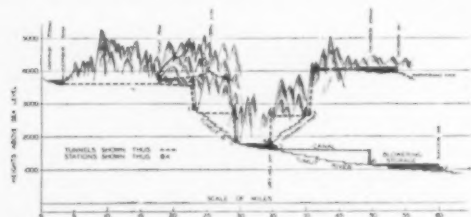


Fig. 7. Sectional diagram of power proposals—Tumut scheme.

a study of the best grouping of the waters, and added the Tumut Valley scheme to the initial proposals for the Snowy.

The Tumut River and the Tooma—the former a tributary of the Murrumbidgee and the latter a tributary of the Murray—carry large quantities of water, and their power potential is great, but both rivers, in their upper valleys, lack sites for major storages. To get the best use from these two rivers, then, it would be necessary to divert the Tooma to the Tumut to form a pond above the first power station. This pond on the Tumut would be connected by tunnel with the Adaminaby storage. Thus it would be possible to pass surplus water from the two rivers to the storage and again draw water from the storage when it was required. The full importance of the second dam at Adaminaby, and the part the Tooma and the Tumut play in the development of the whole of the Snowy Mountains area, will be seen in the next chapter.

Before a study is made of the details of the schemes for the development of the Alps area, it must be realised that the proposals were made only after exhaustive examination was carried out.

Besides the extensive survey and mapping works, and the hydraulic studies that were made, considerable field work was completed. Geological parties made a general study of the area and a detailed study of dam sites and other special regions. Exploratory drilling has been carried out on the major sites, and various possible groupings for the water, routes for tunnels, locations for stations and studies of race lines have been made. In addition, much attention was given to the economics of power development in the areas and the assessment of costs in the preparation of preliminary estimates.

The results of these comprehensive investigations have been gratifying. There are no longer two schools of thought on the use of the Snowy waters. Both schools are now agreed on the disposal of all but one-third of those waters. How the other two-thirds will be distributed is set out hereunder:—

From Snowy (from Eucumbene) to Tumut—235,000 acre ft.

From Snowy to Murray (replacing Tooma water)—335,000 acre feet.

Total diversion of Snowy water agreed upon 570,000 acre ft.

Benefit to Murrumbidgee Valley—570,000 acre ft.

Benefit to Murray Valley—Nil.

The remainder of the Snowy water which can economically be diverted is assessed at 340,000 acre feet.

For this there are two alternative proposals:—

Diversion to the Murrumbidgee.

Diversion to the Murray.

#### THE PROPOSALS.

From the investigations which have been carried out since 1946, and which were originally intended to prove the practicability of the development of hydro-electric power by diverting the Snowy River into the Murray, two major projects have emerged. On the first project the members of the investigating committee are fully agreed.

The first scheme is based on the Tumut River, the main tributary of the Murrumbidgee. The second is concerned with the allocation of the waters of the Snowy River. Although the Tumut scheme is an independent one, it is considered as part of the total development because it involves a diversion of one of the tributaries of the Murray, and a tributary of the Snowy. A description of this scheme will be given first.

#### THE TUMUT PROPOSAL.

In this proposal the waters of the Upper Eucumbene River, one of the largest tributaries of the Snowy, and which flows to join it near Jindabyne, would be dammed and diverted to the Upper Tumut River which is the main tributary of the Murrumbidgee. A second river would also be diverted to flow into the Upper Tumut. This second river is the Tooma, which is an important tributary of the Murray. The Tooma would be diverted in such a way that, when required, the flow of the Upper Tooma and the Upper Tumut could be turned back through the tunnel between the Eucumbene and the Tumut to the storage dam at Adaminaby. The tunnel would be operated, therefore, as a two-way conduit, the direction of the flow being controlled to suit the requirements of the time.

By diverting both the Tooma and the Eucumbene into the Tumut a vast amount of additional water would be available to the Murrumbidgee for irrigation, it would be possible to regulate the Upper Tumut river and allow for the generation of a large quantity of power.

The Tumut scheme could be further extended if the waters of the Upper Murrumbidgee were diverted from a dam near Tantangra to the Tumut Valley. This would permit of the generation of more power. To develop the Tumut Valley scheme the following works would have to be carried out:—

A DAM on Eucumbene near Adaminaby, 1,000,000 acre feet capacity.

A TUNNEL from the dam to the Tumut, 14½ miles long and about 22 ft. diameter.

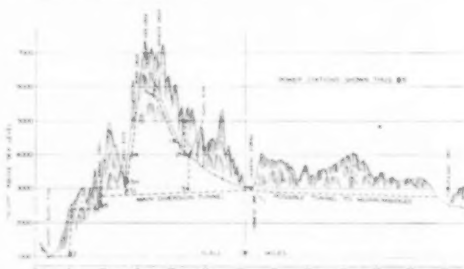


Fig. 8. Sectional diagram of power proposals—Murray scheme.

A TUNNEL from the Tooma to the Tumut, 5½ miles long and about 22 ft. diameter.

2 TUNNELS down the Tumut, totalling about 11 miles long, to power stations 1 and 2.

A DAM on the Upper Murrumbidgee near Tantangra, 300,000 acre feet capacity.

A TUNNEL from this dam to the Tumut catchment 6½ miles long, 16½ ft. diameter, with No. 3 power station at the outlet.

A TUNNEL in the Tumut catchment from No. 3 to No. 4 power stations; length 4½ miles.

A DAM on the Tumut at Lob's Hole, about 100,000 acre feet capacity with power station No. 5.

A RACELINE about 40 miles in length to power station No. 6, past Talbingo.

A DAM at Blowering on the Lower Tumut to regulate the flow for irrigation.

POWER STATIONS (7) Nos. 1 and 2 in Upper Tumut, Nos. 3 and 4 in branch from Upper Murrumbidgee, No. 5, at Lob's Hole Dam, No. 6 on Raceline past Talbingo, and No. 7 at Blowering Dam.

RACELINES in the Upper Murrumbidgee, Upper Eucumbene, Upper Tooma and Upper Tumut catchments, totalling about 130 miles in length.

#### SUMMARY:

DAMS: 4 major.

TUNNELS: 42 miles.

RACELINES: 170 miles.

POWER STATIONS: 7.

POWER: 720,000 K.W.

The second major scheme proposed as a result of the investigations concerns the use of the Snowy River waters after the Eucumbene has been diverted into the Tumut. There are two alternatives still under consideration. These alternatives are called the Snowy-Murray scheme and the Snowy-Murray-Murrumbidgee scheme.

#### THE SNOWY-MURRAY PROPOSAL.

This scheme suggests the diversion of the Snowy River from a storage at Jindabyne west into the Murray River catchment area. Such a diversion would return to the Murray the amount of water lost by the diversion of the Tooma into the Tumut. In addition, additional water would be available for use in the Murray Valley and a vast amount of power could be generated, for it would permit full use of the great drop in the level to the Murray, which is about 2,000 feet.

The development of the Upper Snowy area would be controlled by a storage at Spencer's Creek, fed by canals. There would be two power stations, developing power between Spencer's Creek and Island Bend, and the waters at this point would be dropped through a 1,000 foot shaft via power generators to join the flow in the diversion tunnel to the Murray. The Upper Crackenback River, and the Gangarlin River would be brought by raceline to the same shaft, further augmenting the power generated by the shaft station (No. 3).

On the Murray Valley side, the tunnel would pass under high level streams at the Geehi and Bogong, and these are also added to increase the power produced. A further step would be to collect the waters in the Upper Murray (or Indi) Valley, to bring them also into the main tunnel by a shaft at the Geehi, to add again to the power generated.

The main features of the Snowy-Murray proposal are:—

A DAM at Jindabyne of 800,000 acre feet storage capacity.

TUNNELS from Jindabyne to Geehi River, about 17½ miles long and from 23 to 26 feet diameter; from the Geehi River to Bogong Creek and Swampy Plains River, about 10½ miles long and 30 feet diameter.

POWER STATIONS (5), No. 4 on the Upper Geehi, Nos. 5H and 5L on the Geehi, No. 6 on the Bogong, and No. 7 near Khancoban.

A DAM on the Upper Murray to regulate, for irrigation, the water diverted.

As well as these, the corresponding development of the Upper Snowy area would consist of:—

A DAM at Spencer's Creek of 40,000 acre feet.

TUNNELS from Spencer's Creek to Island Bend, through three power stations, the total length being about 10 miles.

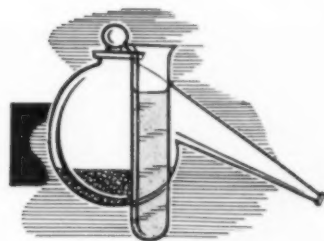
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# THE COMMUNITY, THE NATION, THE WORLD, THE SCIENTIST.

By Sir Herbert Gepp, President, the Royal Australian Chemical Institute.



UNTIL recently, the Scientist was somewhat of a mole, often working "underground," developing his hypotheses, then his theories, then his "Natural Laws," passing them on to his confreres in the so-called "Scientific World," and not bothering about the World in general—that was for the World to worry about, not for the Scientist.

The first sign of a different view of Science was noted during and after the First World War—the Kaiser War. Since then the whole picture has changed in a manner that can be described only as spectacular, "and then some." Let us try and see this picture briefly but clearly.

THE beginning of Science was in the great River Basins where our civilisation started—then the Classical and Medieval periods—the Dark Ages of Europe—the Renaissance and the break with the traditions of Greece and Rome and Egypt. From 1580 A.D. onwards came the flowering of the human intellect. If you want a week of intensely interesting reading, turn to the British Encyclopaedia and other suitable books and read the lives and works of the pioneers of Science and Philosophy, including Leonardo da Vinci, Copernicus, Kepler, Galileo, Torricelli, Harvey, Michelangelo, Erasmus, Shakespeare, Milton, Boyle, Newton, Linnaeus, Arkwright, Levoister, Watt, Jenner, Stevenson, Faraday, Clark-Maxwell, Darwin, Mendel, Pasteur, Lister, Francis Bacon, Wren, John Wesley, Goethe, Beethoven, Robert Owen, Dickens, Tennyson, Kelvin, Daimler, Laurent, Curie, Ross, Fleming, Wilbur and Orville Wright, Rutherford, Florey, and many others.

And what are the facts of the position as at to-day? Here are some of them:—

1. Scientific systematic research on a large scale is new to the world—certainly not more than one hundred years old.

2. Recently it has grown at an enormous rate.

3. A new force has recently arisen—the entry of nations through their Governments into the encouragement of scientific industrial research for so-called progress, prosperity and security.

4. Man has now exceeded Nature as man's worst enemy—in that the very achievements which have added to health and happiness are responsible for misery, terror, and cruelty. The weapons for our destruction are in process of development.

5. As has been pointed out before, a large industrial potential may not be necessary for the next destructive weapon—one research laboratory, and one brewery may supply ammunition for full-fledged biochemical warfare.

6. Despite an almost universal wish for peace—the world has developed a pattern of group behaviour which has brought only tragedy. The psychology of the individual is often not the psychology of the crowd. Is this due to the want of real education of the individual?

7. Radar, sonar, the proximity fuse, the offensive rockets and so forth, in the development of which the Democracies were ahead of the Germans, gave the Democratic Allies the victory in the Hitler war. But the Allies were only just ahead of the Germans. The V I Doodle Bug, if perfected only a few months earlier could have prevented the invasion of Normandy by the Allies.

8. As pointed out by Vannevar Bush, "the submarine is now able to stay submerged for long periods (with only the small end of a pipe sticking out like a swimmer breathing through a straw), is able to out-run pursuers

and overtake fast convoys, and carry long range homing torpedoes which can be fired from a point beyond the range of present sonar." The Nazis were only a few months too late with this undersea engine of destruction.

9. And now we have the Atomic Bomb.

10. All efforts at United Nations have failed to reach an agreement re international control of Atomic Energy.



SIR HERBERT GEPP.

11. The Cold War proceeds at full pace. China comes under control of Communist Leaders; the fate of the East is uncertain; India stands fast at present, but the position in Burma, Siam and the East Indies is disturbed; Western Europe combines with North America to resist infiltration and invasion.

12. There is much concern amongst educationists regarding the process of education of young people who wish to be trained as scientists. Teachers feel that there should be several years of education in the principles of "The Humanities" before these young people enter into the scientific educational course of four or five years. However, at present in Australia young people pass directly from matriculation into the scientific course. Thereafter they are so busily occupied that, except in a few cases, portion of their brain becomes atrophied with a consequent inability to contribute towards the development of social sciences and their practical application.

13. Whilst all men have a primary obligation to the society which sustains them—and particularly those men whose "nurture" has been sufficiently prolonged to enable them to reach one of the many working faces where new knowledge is being gained—the absence of a balanced education makes this primary obligation a matter of difficulty and in a number of cases a practicable impossibility.

14. Many scientists are torn between their National and their International obligations. Freedom for creation is one of the deepest

and most important social ideas. The growth in recent times of the belief that the Nation can properly demand the complete, or almost complete submission of its individual members to the National purpose has made things very difficult for many scientists. It is, indeed, stated by many that it has made Nationalism into a world menace.

And at long last the Scientists are waking up and asking "How should men of Science act in the face of the increasing concern of the State with Science and the consequent increasing pressure of the State on Science?"

I have thought and read much on this vital problem. Nowhere, so far as I know, has there been a better contribution to this problem than in the August-September issue of the "Bulletin of the Atomic Scientists," published in Chicago, U.S.A. This issue contains an article (reprinted from the June 25 issue of "Nature") by Julian Huxley, the distinguished British Biologist, entitled "Freedom for Science—An Appeal for Action," and an article by Bart J. Bok, of Harvard University, Chairman of the National Research Council's Committee on U.N.E.S.C.O., entitled "Freedom of Science and the Universal Declaration of Human Rights."

Space permits only of brief summaries of these two impressive articles.

Professor Julian Huxley asks whether scientists can accept the existence of an official scientific policy? Can they accept the possibility that the majority of men of science shall be paid by the State and that the major cost of scientific work shall be borne by Government funds? Can they accept official direction as to what subjects shall be investigated? He thinks that they can—but with certain clearly formulated provisos. For instance, Governments can direct the work of many scientists towards efforts to raise the standard of life, to improve health, to increase production, or to promote military efficiency. They can demand that the scientific curriculum shall be adequate and framed to give the best possible understanding of Nature and man's place in Nature, of the social functions of science and of its intellectual and practical importance. They can assist in campaigns to help the general population to understand the value and importance of science in part or in whole. They can assist in combating anti-scientific attitudes of mind and promoting an understanding of scientific method—of its value and importance.

Scientists can, however, agree only on certain conditions. Scientists must agree that Governments have no right to pronounce on the truth or falsity of any scientific facts, laws or theories—they must not subordinate the intellectual autonomy of science to any other criteria, nor to try to impose a scientific orthodoxy.

Governments must recognise that science is essentially a universal activity—that major advances in scientific knowledge cannot be



planned to order. Governments should permit the utmost freedom of publication consonant with military security, and they should leave a considerable "Unplanned Sector" of fundamental research to the free choice of the pure scientist.

Scientists, and particularly biologists, should see that the great generalisations of modern genetics and evolutionary biology should be admitted as an indispensable part of general education.

Scientists should combine to agree upon a public statement brief yet comprehensive—a profession of scientific faith—and affirmation of the rights and duties of science and of scientists.

Governments in return should guarantee certain rights to science and to scientists while presumably at the same time defining certain duties expected from them.

Professor Julian Huxley then raises the question as to how to persuade the U.S.S.R. and its satellites to reverse its present policy towards science. He refers to the actions and the methods of Lysenko and of the Academy of Scientists, and describes them in his view as intellectually and socially deplorable. He says that if the issues of principle which they have raised are clearly appreciated by men of science, then the battle of Soviet genetics will not have been fought and lost in vain. Because this will mean that over the great part of the world the scientific movement will for the first time have become fully conscious of itself and of its social functions and of its vital importance.

Mr. Bart J. Bok has prepared for U.N.E.S.C.O. a pamphlet entitled "Freedom of Science and the Universal Declaration of Human Rights." U.N.E.S.C.O. has permitted the "Bulletin of the Atomic Scientists" to publish a long resume of this pamphlet which is to be issued within the next month or so. Mr. Bok endeavours to answer the question posed by Professor Julian Huxley in the article to which I have just made reference.

He says that "If conditions make it necessary that there be certain restrictions on his freedom of communication the Scientist wants to know what these restrictions are, and he should be free to reject research opportunities which do not guarantee to him the minimum requirements of freedom which he considers essential for his work—twenty years ago the problem of freedom of science did not seem very acute. The Atomic Bomb, jet propelled guided missiles and biological warfare were still to be found only in imaginative novels and in the comics. We still had to learn by experience how totalitarian states

can restrict and pervert science. Freedom of science is at most only a part of the much broader area of intellectual freedom." And then Mr. Bok asks, "Is Freedom really essential to scientific advance?"

He then makes six points which I summarise briefly:—

1. Modern technology and industry are dependent upon the results of pure scientific research.

2. The communists maintain that there is no science divorced from politics.

3. In non-communistic countries, increased government activities in conservation, power development, agriculture, transport and health have made necessary more dependence by governments upon scientists.

4. The Kaiser and the Hitler Wars have shown that science and technology are all important to modern warfare.

5. Modern science is elaborate and expensive.

6. Experience has shown that in some areas of science, for example in medicine and applied science, knowledge can be advanced rapidly by teams of research workers.

After having dealt at some length with the growing importance of science to society, Mr. Bok proceeds to deal with the many methods by which individual scientists can discharge their social responsibilities to society. He then describes the efforts that he and others have made to produce a "Charter for Scientists," the basis being the Universal Declaration of Human Rights which was adopted only recently by the Assembly of the United Nations. This draft Charter for Scientists is so important that I take the liberty of quoting it in full for study by all of those who are interested in International Peace. The draft reads as follows:—

"In consideration of the prominent place which science holds at present in society, and of the rapid transformation of the world through the application of science, and in consideration further of the fact that scientists can obtain and use information not readily available to others, the scientific worker has certain obligations toward society over and above the ordinary duties of citizenship.

It is, therefore, the duty of every scientist:

- (a) to maintain a spirit of honesty, integrity and co-operation;
- (b) to examine searchingly the meaning and purposes of the work that he or she is performing, and, when in the employ of others, to inquire into these purposes and to evaluate the moral issues that may be involved;
- (c) to promote the development of science in the ways most beneficial to all man-

kind and to exert his or her influence as far as possible to prevent its misuse;

(d) to assist in the education of the people and of governments in the aims, methods, and spirit of scientific research and to keep them abreast of scientific progress;

(e) to promote international collaboration in science, to work for the preservation of world peace, and to contribute toward a spirit of world citizenship;

(f) to emphasise and develop the human values associated with science and technology.

In order to be able to fulfil these obligations, scientists must claim certain rights, the principal ones of which are:

(g) the right to participate freely in all activities permitted to the average citizen;

(h) the right to obtain general information about the purposes for which assigned projects are being done;

(i) the right to publish the results of his or her researches as well as full freedom to discuss work in progress with other scientists, except where these privileges may have to be restricted for socially or ethically justifiable reasons."

In this survey of this all important subject I take leave also to refer readers to an article by Professor Michael Polanyi, F.R.S., Professor of Social Sciences in the University of Manchester, formerly Professor of Physical Chemistry in the same University.

This article forms Occasional Pamphlet No. 6 of the Society for Freedom in Science, published in September, 1947, and is re-published in the Australian Journal of Science dated 21st February, 1949, by the Australian National Research Council of 157 Gloucester Street, Sydney, N.S.W.

I can give only one quotation from this interesting and valuable contribution:

"To guess the solution to a problem offered by Nature—as is demanded of the scientist—requires the exercise of intuitive faculties controlled by an intellectual conscience."

My study of this vital problem which is facing everyone, leads me to agree with a number of other students, namely, that it is not only the duty and responsibility of the Scientist as such, but also of individual men and women everywhere, to determine how science is to be used and what are the controls which we must introduce.

I have not attempted to give any solutions. My main objective has been to try and clarify some of the facts and to submit for thought and study some of the associated problems.

near the 4,000 foot level, however, so that the Jindabyne storage could not be used for diversion to the Murray and no other suitable storage has been found adjacent to the site.

The task of bringing the waters of the Snowy Mountains area into the service of the Australian people will be one of the greatest projects in the history of this country. It is bigger than any State—bigger than any section of the nation. It belongs to no one State or one group of people but to the nation.

Australia will eventually become a mediocre country or a great one according to the amount of power which can be developed here. To a great measure, Australia's ability to take its share of Empire defence will be dependent on rapid development of this power. For that reason, any scheme which promises additional power production must receive the fullest consideration. The Snowy Mountains waters are capable of providing power equal to one-third of our total black coal output, or an equivalent amount of power as would be provided by 1½ million gallons of crude oil a day.

But the value of hydro-electric power from the Snowy Mountains has a greater significance to the nation than this. It is more than a mere substitute for coal; it can become one of the greatest defensive weapons this country has ever possessed—one of the greatest influences on the de-centralisation of industry and population, and can help immeasurably to keep Australians on the land by bringing to the homesteads and the selections the comforts enjoyed by urban dwellers.

That use must be made of the waters most people are agreed upon, but that the fullest use must be made of them is not generally appreciated. Future generations will call the men who develop the waters great men, or small men, according to the way in which they use their powers.

## "ELECTRICAL DISTRIBUTION"

Continued from page 132

### RACELINES—

- (a) 81 miles long, feeding Spencer's Creek Dam and to the tunnel lines between Spencer's Creek and Island Bend.
- (b) 34 miles long, from the Upper Crackenback River to Island Bend.
- (c) 12 miles long, Mowamba River to Jindabyne.
- (d) 199 miles long, bringing additional water into the main tunnel at the Gechi and Bogong Creek.

A SHAFT about 1,000 feet deep at Island Bend, to carry the waters from the Upper Snowy River and from the Crackenback into the main tunnel.

POWER STATIONS (4), Nos. 1, 2H and 2L on the tunnel lines, and No. 3 near bottom of shaft.

### SNOWY-MURRAY-MURRUMBIDGE PROPOSAL.

In this combined scheme, the proposal is to return to the Murray Valley an amount of water corresponding to that taken from it by the diversion of the Tooma tributary to the Tumut, viz., about 350,000 acre feet per year. The balance left, about 340,000 acre feet per year, would be diverted from a dam at Jindabyne to the Murrumbidgee, the main works being 26 miles of tunnel and 2 miles of pipe-lines to a power station on the Murrumbidgee and a dam at Billililera. A power scheme below Billililera is also possible.

With the Snowy-Murray portion of the scheme the proposal would be to divert the 350,000 acre feet per year by a tunnel direct to the Murray Valley from a point near Island Bend. A shorter tunnel would be needed than in the Snowy-Murray scheme, and of considerably smaller cross-section. The level of the tunnel would be



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*Harvest Time on the North-West Coast, Tasmania.*

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*Sandy Bay, Hobart.*



*Coolangatta Beach on the South Coast of Queensland.*



*The Beach on Green Island, Queensland.*



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*A great tourist attraction—Coral Reef off the Coast of Queensland.*



*The Hinchinbrook Channel off the Coast of North Queensland.*



*Scene from Buchan's Point, Cook Highway, Queensland.*



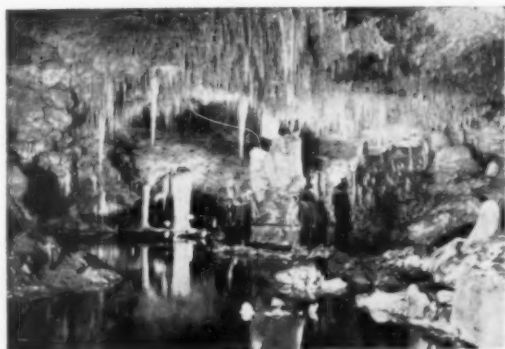


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(Top left) Karri Pine Forest near Pemberton, W.A. (Top right) A View of Perth from King's Park. (Upper right) A popular bay on the Swan River. (Lower right) The Town and Harbour of Albany, W.A. (Bottom left) A Lake Cave on the Margaret River, W.A. (Bottom right) Trout Fishing at Beadallup Falls, near Pemberton, W.A.





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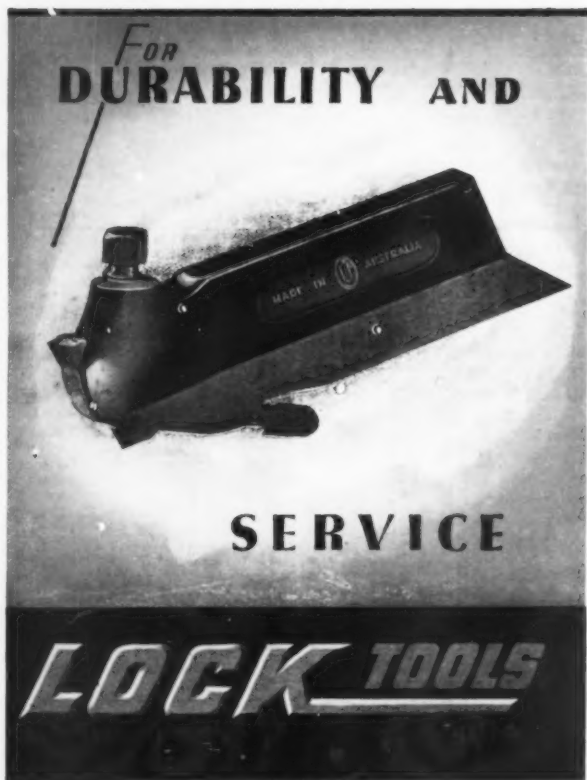
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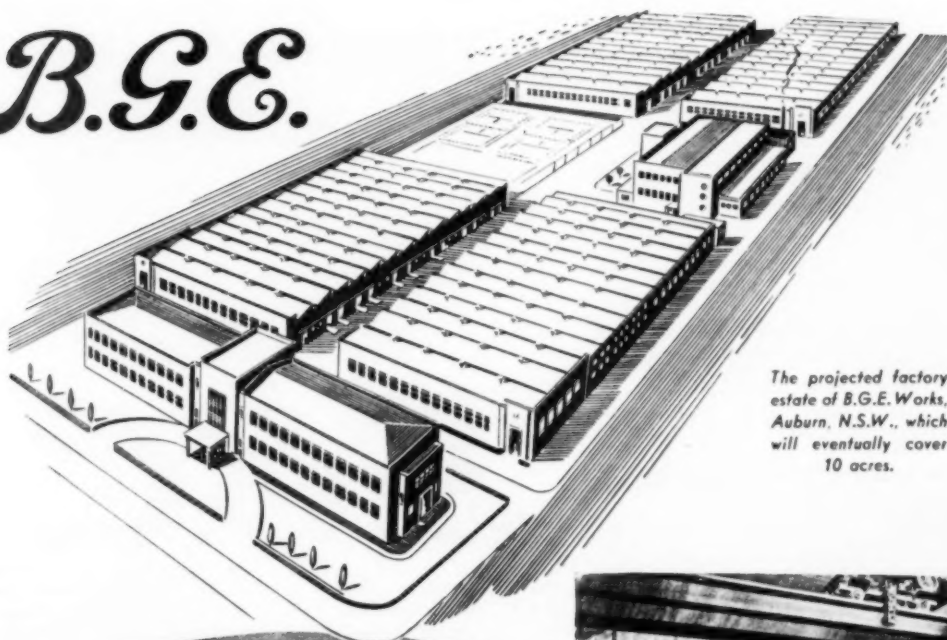
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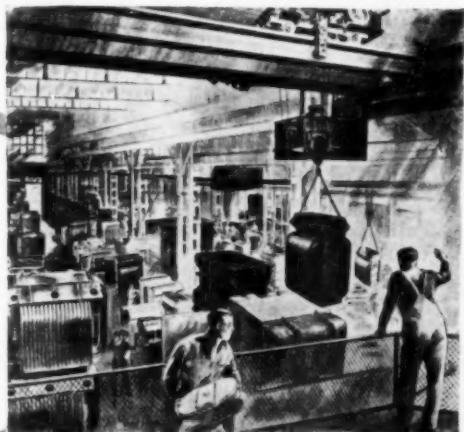


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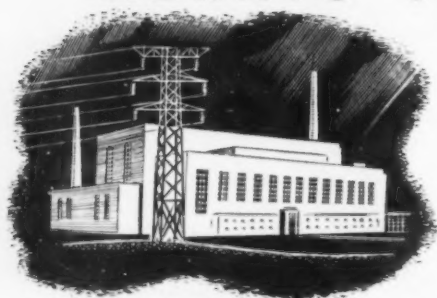
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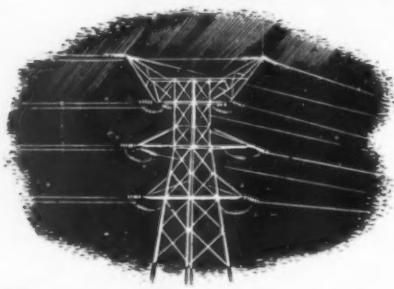
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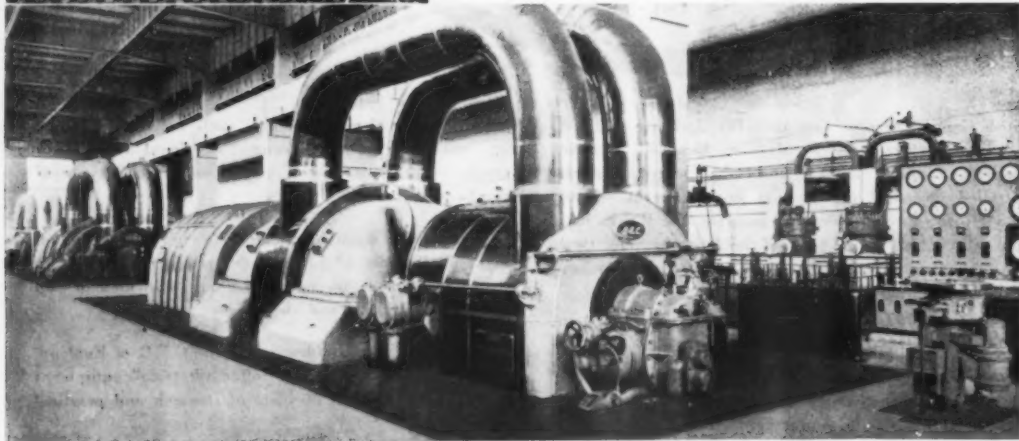
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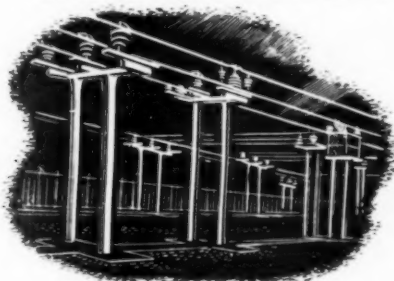
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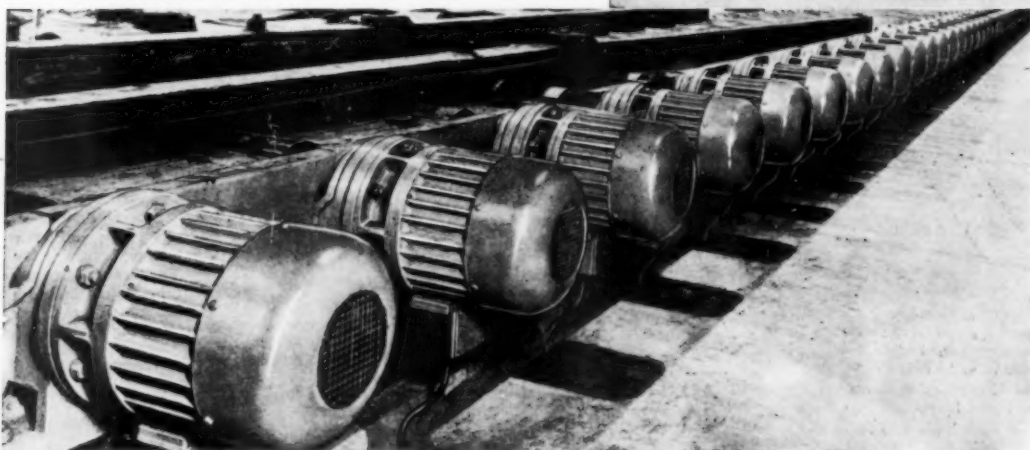
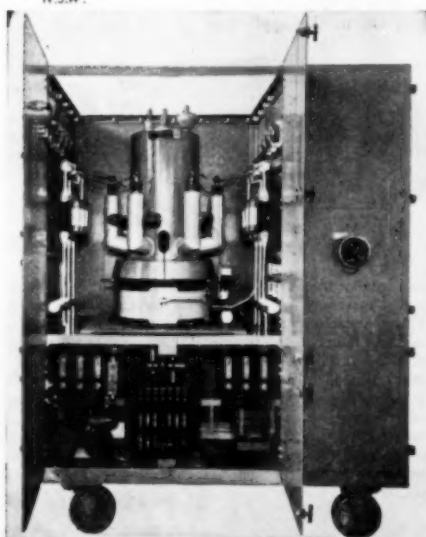
100 KW., 240 V., D.C. Grid control G.E.C. Mercury Arc Rectifier, operating from 415 V., 3 phase, 50 cycle, A.C. Mains, installed in the Granville Technical College, N.S.W.

## B.G.E.

In the field of Transportation G.E.C. undertakes the manufacture (in addition to Diesel Electric Locomotives): Electric Motors and Control gear for railway, tramway, and trackless trolley buses, and complete sub-station equipment.

For the metal industries G.E.C. productions include: Heavy Driving Motors and their ancillary machinery (an example is given below), Switchgear and the fine controls necessitated by modern practice. Remote control apparatus and supervisory control equipment associated with power houses, sub-stations and innumerable other applications in which the generation, transmission, distribution and use of electrical energy is involved—in all services essential in maintaining safe, reliable and economical electricity supplies—the highest-class equipment carries the hallmark **G.E.C.**

G.E.C. low-frequency roller motors on the run-out table of the hot mill in a large steel works.



# Electric Co. Pty. Ltd.

of The General Electric Co. Ltd. of England)

ADELAIDE, HOBART, LAUNCESTON, TOWNSVILLE.



# ELECTRIC MOTORS IN AUSTRALIAN INDUSTRY

THE manufacture of electric motors on a commercial scale has been carried on in Australia for over a quarter of a century. During this period local manufacturers have built up an extensive experience in this field of engineering, and the quality and performance of Australian-made motors compares favourably with those of motors produced anywhere in the world. As in every field of manufacture, however, the production of electric motors has its particular problems, amongst which is the specialised application for which the standard range of electric motors is unsuitable. The range of ratings and speeds produced by Australian motor manufacturers, however, is capable of meeting well over ninety per cent. of the normal requirements of industry.

**S**PEED control is a factor not often readily understood by the average motor user, and serious difficulties in this regard are not uncommon in the application of type. There is not the least doubt that its wholly-metallic construction makes such a rotor normally indestructible and the most desirable type as it can withstand mal-

useless to apply to a machine, such as a printing press, a motor having an unnecessarily high horse power. Where speed control is required from the slipping type of motor

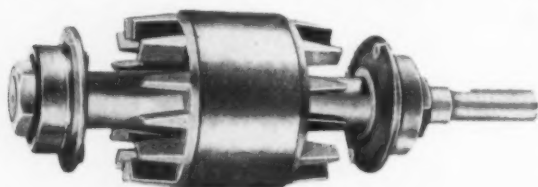


Figure 1.

electric motors to modern machines and processes.

The efficient operating speed of an electric motor is, of course, determined by its design, but some consideration of this problem may help to clear away the misapprehension and disappointment which users often experience, due to difficulties in adapting standard types of motors to special or semi-special applications.

treatment in service. In its construction winding is eliminated by an aluminium cage cast into slotted laminations to form, with a solid shaft, a well balanced rotor unit known as "squirrel cage" rotor. "Squirrel cage" rotors made for Australian Manufacturers and for use with their products, large and small, must surely number a million. Not all, of course, coming from any single motor maker

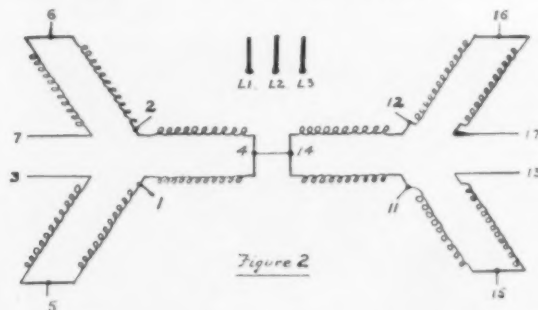


Figure 2

If every mechanical process required a constant speed, then the manufacture of Rotors for Electric Motors would be simplified. The solid type of rotor shown in Figure 1 would become a universal

The needs of industry often require motors with two, three or more speeds. Manufacturers have processes not easily adaptable to a motor having a constant single speed. It is fortunate that the type

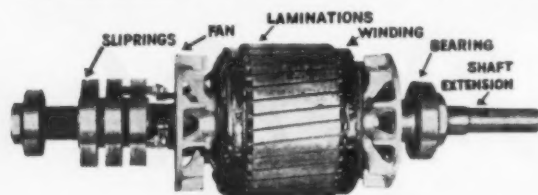


Figure 3.

when a process requires a motor with four distinct speeds, the stator is made with two separate windings, each provided with tapings so that 4, 6, 8 or 12 pole connections may be made. Then on the usual 50 cycle circuit the user obtains 1,440, 960, 720 or 480 r.p.m. to suit his process.

Figure 2 shows one arrangement of the two windings of a 4 speed, constant-torque, three-phase, squirrel-cage motor with terminals 4 and 14 permanently joined. Now, if L1, L2 and L3 represent the supply lines, the method of connecting the motor terminals to the supply will be as shown in Table 1:

The motor may be left connected for any of the speeds or a system of switching introduced to change speeds. That introduction reduces the complication of changing speed to the mere effort of pressing a button. There is an inherent characteristic which keeps the motor to the set speed, although it could be overloaded by carelessness to such an extent that it would stall to zero speed, with damaging results.

When set speeds are not required, but gradual speed variation over a range is needed, with a steady break-away from rest, the rotor usually employed is of the slipping type as shown in Figure 3. This type is used on cranes, fans, and other applications necessitating regulation of speeds within defined limits. The motor requires a controller and resistance to obtain control over six or seven steps, which may take the speed down to 50 per cent. of maximum. With a very light load the current circulating in the rotor and its resistance is often too small to create an ohmic condition and the motor's natural tendency is to run at a speed near the maximum. It is, therefore, disappointing and often

the H.P. of the motor being an equal match for the load created by the driven machine. The use of undersize slipping motors should also be avoided. The features of the slipping rotor and the much more rugged construction of the

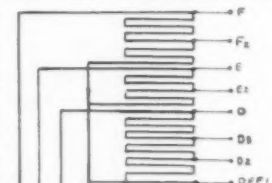


Figure 4.

squirrel cage type are thus readily contrasted. Poor comprehension of the construction of the two types of motors, little idea of the ability of each type and incorrect application spells trouble for the user.

The external connections of a slipping rotor, in order to obtain speed control, are to a set of resistances as in Figure 4, from which



Figure 5.

it is clear that any movement of a controller which connects terminals F to F2 would short out the part of the resistance between F and F2. As the resistance is so reduced so does the speed change; provided always that the motor has the load of work to drive. When the user would be wise to insist on

(Continued on page 263)





## M.V. Turbo-Alternators for Pyrmont "B"



**AUSTRALIAN  
GENERAL ELECTRIC**

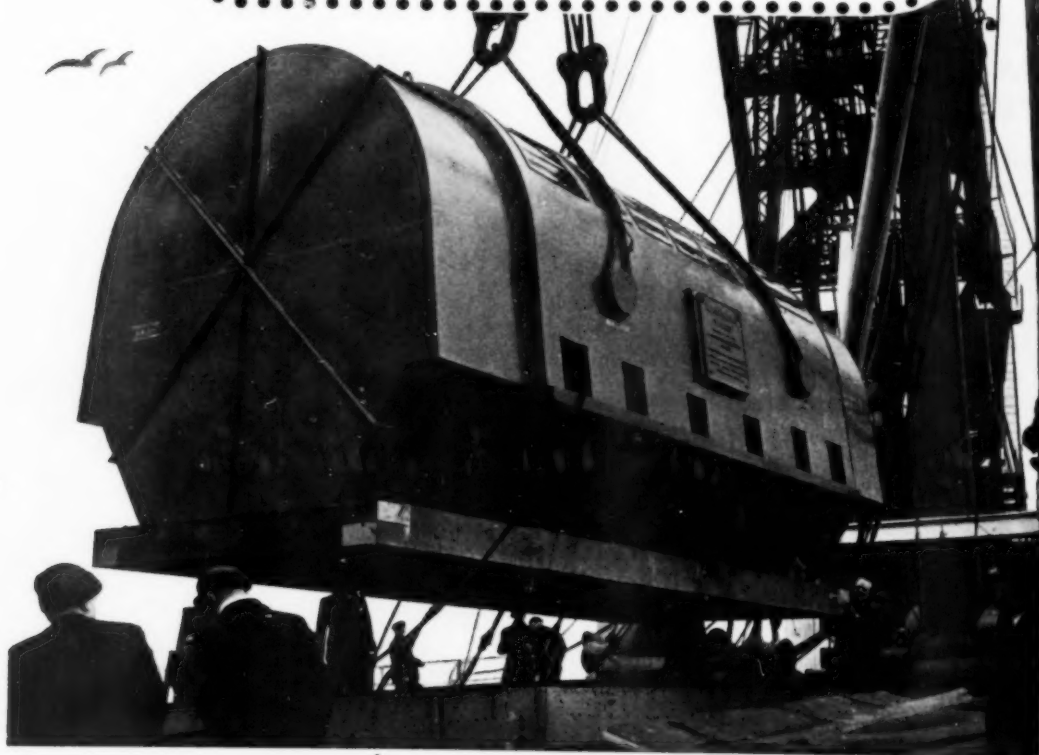
PROPRIETARY LIMITED

Sydney, Newcastle, Lismore, Melbourne, Brisbane,  
Rockhampton, Townsville, Adelaide, Hobart, Launceston.  
Agent in W.A., Atkinson (W.A.) Ltd.



Shown below is a 106-ton stator being loaded in England for shipment to Australia—part of a 55,500 kVA, .9 P.F., 33,000 volt M.V. Turbo-Alternator.

Australian General Electric Proprietary Limited is supplying four Turbo-Alternators for the new high pressure power station, Pyrmont "B," Sydney. The turbines incorporate three cylinders, arranged for a steam pressure of 1,200-lb. per sq. in. with a total temperature of 925° F. at the stop valve. Each set has a length of 87 feet.





# 'E N G L I S H

**T**HE ENGLISH ELECTRIC COMPANY manufacture not only steam turbines, water turbines, diesel engines and locomotives, but also alternators, generators, motors, transformers and switchgear, and thus provide undivided responsibility and ensure the efficient running of the combined units.

## for Com

### HYDRO-ELECTRIC PLANT . . .

Four 17,000 H.P. English Electric Turbines and Alternators at Waddamanna Power Station, Tasmania.

Over 550,000 H.P. of "English Electric" Hydro-Electric Plant is installed or on order in Australia and New Zealand.

### STEAM-TURBO ALTERNATORS . . .

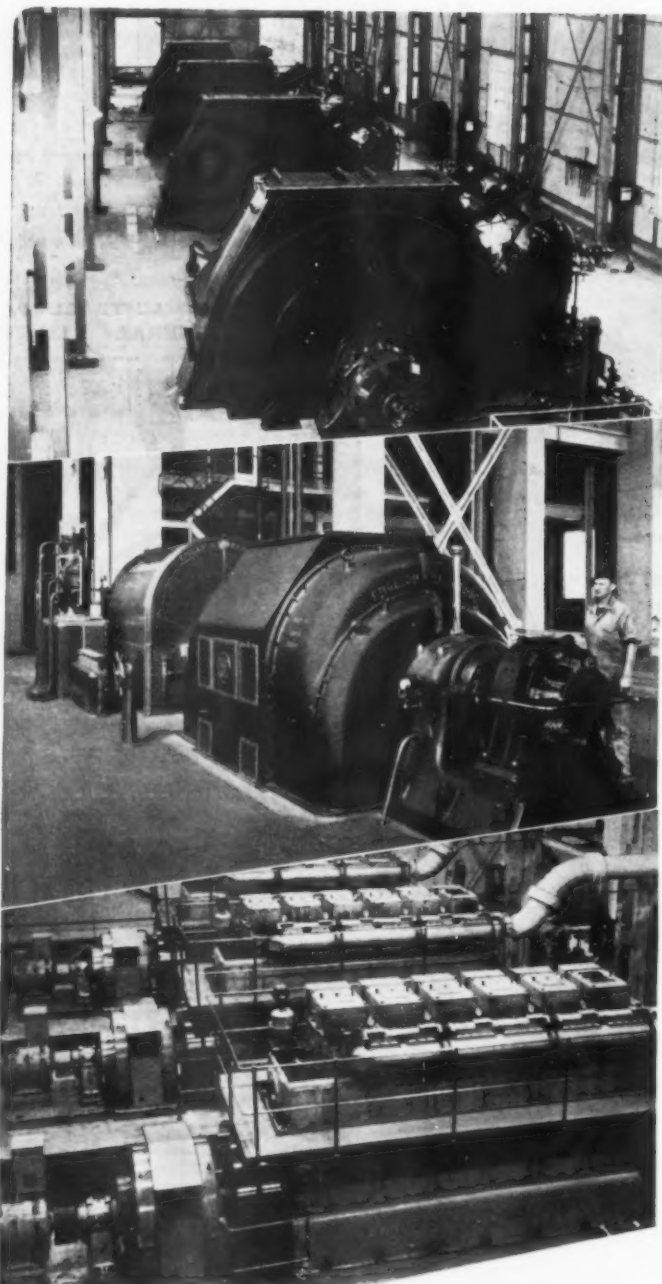
The first High Pressure Steam Turbine installed in Australia working at 1,200 lbs. per square inch 900°F. and discharging steam at 225 lbs. per square inch.

Two 25,000 kW condensing sets are being supplied for the same stop valve steam conditions to Balmain Power Station.

### DIESEL-ELECTRIC PLANT . . .

Three 500 kW "English Electric" Diesel Engines and Alternators installed at Cockatoo Island, Yampi Sound.

Over 120,000 H.P. of "English Electric" Diesel Engines are installed or on order in Australia & territories controlled therefrom for stationary generation, traction or marine duty.





# ELECTRIC

## prehensive Installations of Electrical Plant



### DIESEL-ELECTRIC LOCOMOTIVES . . .

One of two South Australian Railways 350 H.P. Diesel Electric Shunting Locomotives are Powered with English Electric Diesel-Electric Equipment.

Over 65,000 H.P. of "English Electric" Diesel - Electric Locomotive Equipments are being supplied to Australia, including 45 complete Diesel-Electric Locomotives.



### ROLLING MILL PLANT . . .

The 21,000 (peak) H.P. Blooming Mill Motor at the Newcastle Steel Works.

Over 200,000 (peak) H.P. of "English Electric" rolling mill plant is installed or on order in Australia.



### FUSEGEAR . . .

Typical "T" type "English Electric" high rupturing capacity Cartridge Fuse Link.

Large stocks are now available of fittings and cartridges from 2 to 800 amps.

Combination Fuse-Switch Units and Switchboards, Ironclad Distribution Fuseboards and Overhead Busbar Distribution Systems are also available.

## THE ENGLISH ELECTRIC CO. LTD.

(INCORPORATED IN ENGLAND)

AUSTRALIAN OFFICES:

SIEMENS (AUSTRALIA) PROPRIETARY LTD.

SYDNEY • MELBOURNE • ADELAIDE • BRISBANE • NEWCASTLE

FLOWER DAVIES & JOHNSON • PERTH

H. M. BAMFORD • . . . HOBART



# THE ENGLISH ELECTRIC CO. LTD.

## EXPANDS IN AUSTRALIA

THE commencement of a new era in the manufacturing potentiality of Queensland was marked on 8th November, 1949, when one of England's largest engineering organisations, The English Electric Company Limited, officially took over from the Commonwealth Department of Supply and Development, the fine heavy machine shop at Rocklea known as the Marine Engine Works.

THE factory recently taken over by the English Electric Co. Ltd., at Rocklea, Queensland, covers an area of 70,000 sq. feet, and houses a wide range of machine tools, including large capacity horizontal and vertical boring machines, planers and lathes, with crane capacity up to 50 tons.

Originally established in 1942-1943, this Works was designed as Queensland's contribution to the war effort in the direction of engine building for the 9,000, 6,000 and 2,500 ton merchant ships which were programmed for construction in Australia under the direction of the Australia Shipbuilding Board, and in the provision of heavy machining facilities for repairs to machinery of naval and merchant ships, and in the service of industry generally.

Main propelling machinery for the 9,000 ton "A" Class ships, "River Fitzroy," "River Norman" and "River Burnett," has been built by the Works, as well as that for the 2,500 ton "D" Class "Dulverton" and the 6,000 tons "B" Class "Bilkurra." The machinery for another "B" Class vessel, "Binburra," is in an advanced stage of construction, as are also a number of cargo winches and steering engines, and a considerable quantity of heavy machine work for large extensions to steel mill equipment now being undertaken by Australian Iron & Steel at Port Kembla, as well as other heavy work for crushing plant at Queensland sugar mills.

All this work will be completed by the English Electric Company Limited, and it may confidently be expected that they will greatly extend their range of electrical plant manufacture in Australia.

In addition to the above factory, the English Electric Company Limited have operated, for many years, a works at Auburn, N.S.W., at which a quantity of traction control gear, coal cutter and loader motors, industrial and rolling mill motors up to 450 h.p., and other electrical equipment has been built, and this works will continue to function.

Offices are established throughout Australia and are as follows:—

Sydney (Head Office)—The English Electric Company Limited, 131 York Street.

Brisbane—The English Electric Company Limited, National Bank Buildings, Queen Street.

Melbourne—The English Electric Company Limited, 189 William Street.

Hobart—H. M. Bamford & Sons Pty. Ltd., 89 Macquarie Street.

Adelaide—Siemens (Australia) Pty. Ltd., 85 Grenfell Street.

Perth—Flower, Davies & Johnson Ltd., 413 Murray Street.

In England, The English Electric Company Limited has five main factories, producing the

range of electrical and mechanical plant noted below:—

Rugby—Steam and Water Turbines and Heavy Diesel Engines.

Stafford—Switchgear, Transformers, Mercury Arc Rectifiers, large Motors of all classes, Generators, Meters, etc.

Bradford—Industrial Motors and Control Gear, Prototype Traction Motors and Control Gear.

Preston—Electric and Diesel Electric Locomotives, Motor Coaches and Equipment, Diesel Engines and Aircraft.

Liverpool—Switchgear, Fusegear, and Domestic Appliances.

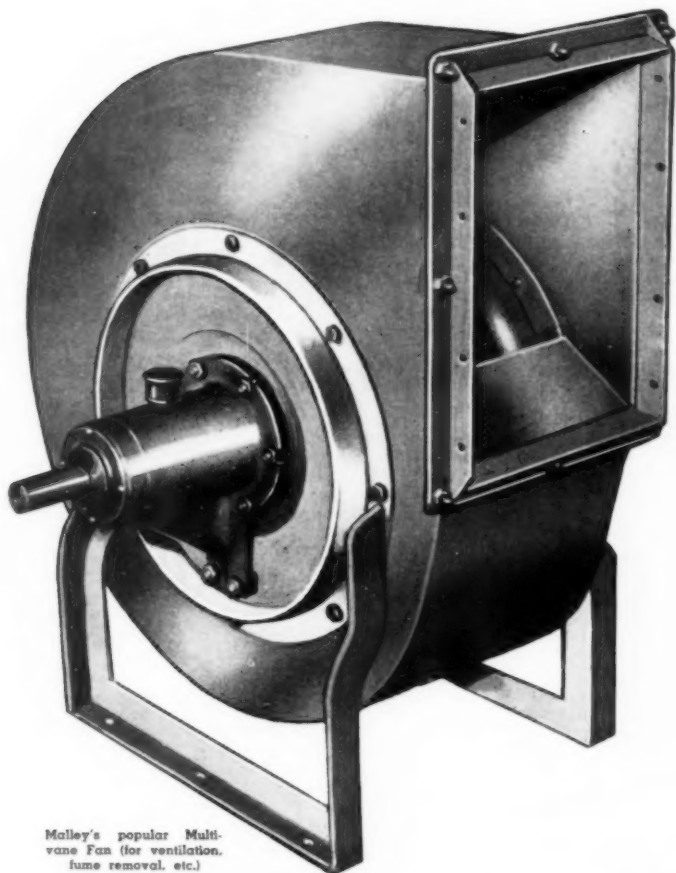
In addition, the English Electric Company Limited has a controlling interest both in D. Napier & Sons, of Acton, London manufacturers of aircraft piston, gas turbine and jet engines, diesel engine exhaust gas pressure chargers, etc.; and in Marconi's Wireless Telegraph Co. Ltd.

Continued technical liaison is maintained with the Westinghouse Electric Manufacturing Company Limited, of America, and at Stafford, the English Electric Company Limited have built the magnificent Nelson Research Laboratories, and installed them with the latest equipment to ensure that all design is backed by research.



Aerial view of the new Rocklea (Q.) works of the English Electric Co. Ltd.



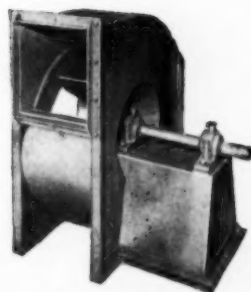


Malley's popular Multi-vane Fan (for ventilation, fume removal, etc.)

# FANS

FOR EVERY  
INDUSTRIAL PURPOSE

by



Malley's Heavy Duty Mill Exhaust Fan.

Whatever the dust-extraction or debris-collecting problems. Engineers and Manufacturers are invited to discuss them with Malley's technical staff of highly competent designers and artisans.

For many years Malleys Limited have specialised in the design, manufacture and installation of dust exhaust and collecting systems for foundries, textile factories, shoe factories, plating and polishing shops; in fact, wherever dust and debris must be quickly extracted and removed.

A typical example of Malley's work is a system which extracts sawdust, shavings, sander dust, etc., from wood-making machines in sawmills, joinery, box-making and furniture factories.

To complete this picture of versatility, similar equipment is available for the removal of smoke, steam, fumes, foul air, and for general ventilation. Malley's lead the field in the manufacture and application of exhaust fans to any industrial purpose.

## MALLEYS LIMITED

50 Mountain Street, Sydney. M 6181  
Telegrams: MALLEYS, SYDNEY.  
Works: ALEXANDRIA, N.S.W.

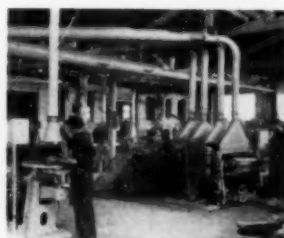
BRISBANE: 487 Adelaide Street, BRISBANE. B 2595  
Telegrams: MALLEYS, BRISBANE.

(Illustration: Left)

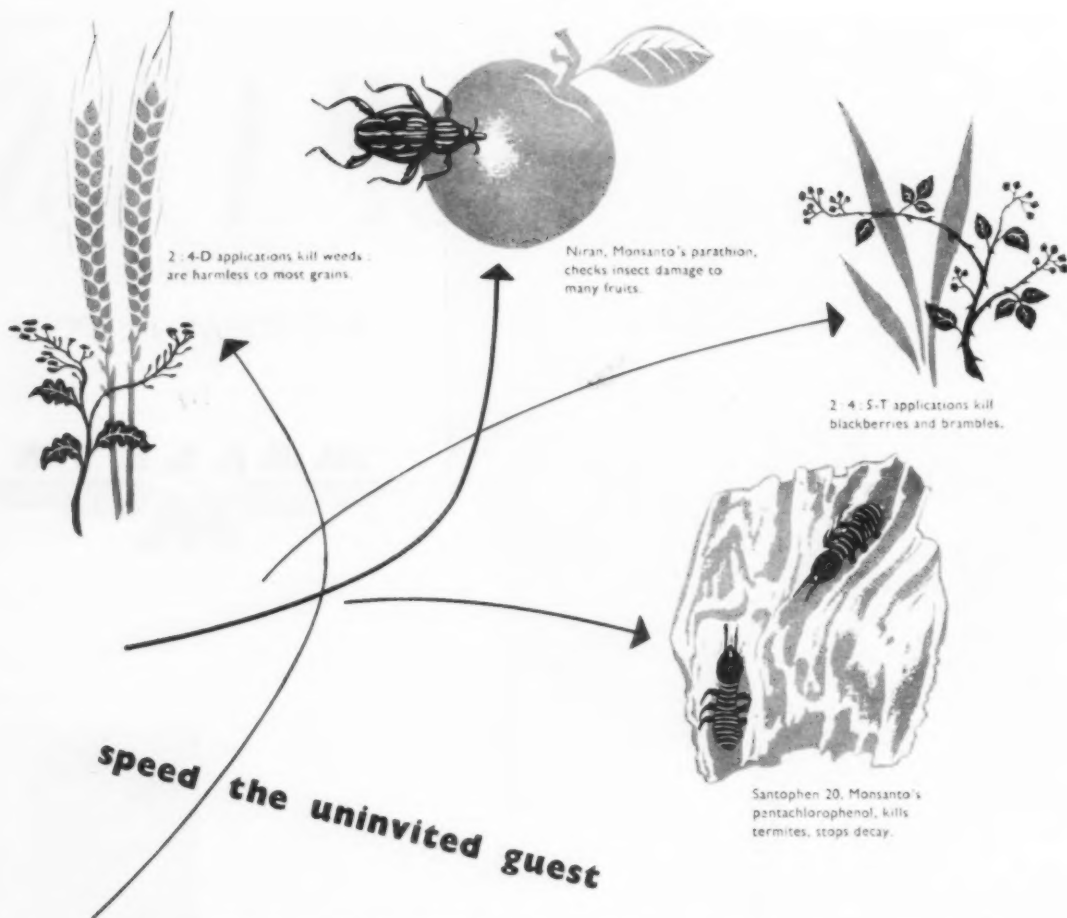
Sawdust conveying system in a large furniture factory, showing discharge pipes and cyclone collector.

(Illustration: Right)

Suction pipework from woodworking machines, using Heavy Duty Exhaust.



B2/FP. 42.



Every year the farmer is invaded by armies of uninvited guests. They are the weeds and insect pests that damage and destroy, leaving a path of wreckage that wastes a substantial proportion of the nation's agricultural crops.

Fortunately the stay of these unwelcome invaders can be cut short by the use of the many chemicals made by Monsanto for agricultural purposes.

There are Monsanto chemicals that kill smothering, strangling weeds and give crops a chance to grow and thrive.

Many fruits and vegetables are protected against costly insect damage with chemical formulations that can be sprayed or dusted. Timber and fencing posts last many years longer when treated with a Monsanto preservative.

An early leader in the development of chemicals for agriculture, the world-wide Monsanto organisation continues to explore new and better ways to safeguard the nation's agriculture.

#### MONSANTO CHEMICALS (AUSTRALIA) LIMITED

(Head Office) Somerville Road, Braybrook, Victoria . . . servicing Victoria, South Australia and Tasmania

#### INTERSTATE SALES OFFICES:

New South Wales, Queensland

#### MONSANTO AGENTS:

Western Australia, New Zealand

SERVING INDUSTRY . . . WHICH SERVES MANKIND

#### MONSANTO AGRICULTURAL CHEMICALS

##### Weed Killers

2:4-D  
2:4:5-T  
Pentachlorophenol.

##### Insecticides

Niran  
Pentachlorophenol.

##### Fungicides

Fungisal O  
Fungisal W.





General view of works, Monsanto Chemicals (Australia) Ltd.

## CHEMICALS IN MODERN AGRICULTURE

### DEVELOPMENTS BY MONSANTO CHEMICALS (AUSTRALIA) LTD.

WHILE the dislocation caused by World War Two, combined with the present dollar shortage, has indirectly helped Australian Secondary Industry to progress as never before, these two factors have allied—at the same time—to place Australian Primary Production on its highest footing since the establishment of the Commonwealth.

With staple food shortages in Great Britain and Europe, and with a large proportion of our dollar supply dependent on the sale of primary products, increasing attention is being paid to more efficient production methods. It is providential, therefore, that with the demands being made on the food bins of the world, we in Australia are entering upon a new era of chemical and mechanical aids to farm production destined to change the whole face of agriculture in this country.

FROM the laboratories of associated concerns in the United States of America, from the captured archives of the German chemical industry, and from their own laboratories and production plant at Braybrook, Victoria, Monsanto Chemicals (Australia) Ltd. have made available a whole new series of chemicals to fight the two greatest enemies of the agriculturist — weeds and insect pests. A brief review of these products and their uses is given in this article.

#### WEED KILLERS.

These fall into two broad categories: contact weed killers, which "burn off" all vegetation above the ground, causing so much damage that the root usually dies — and translocated type compounds, which are absorbed throughout the whole plant reaching to the farthest root. Of the latter type produced by Monsanto, the most important and revolutionary are the selective herbicides — weed killers which destroy plants of a specific type only, leaving the main harvest crop unharmed. The two most effective agents in this category are:

**2:4, Dichlorophenoxyacetic Acid.** This is a selective herbicide of the plant hormone type having its maximum effect on broad-leaved varieties of weeds which it kills by destroying their ability to store starch. Being non-toxic, it is completely safe to handle, and is most useful for weed control among cereal crops, corn, sugar cane, onion plants, etc.

In tests carried out at Melton,

Victoria, in which two narrow strips of an oat crop heavily infested with turnip weed were sprayed, a subsequent examination showed the turnip weed in the sprayed portion to be badly affected, while the unsprayed portion continued in full bloom (see illustration). As can be seen, the oat crop did not suffer in any way.

**2:4:5-T, Trichlorophenoxyacetic Acid.** This is another selective herbicide of the plant hormone type, but which has its maximum effect on woody types of weeds such as blackberries, hawthorn, lantana, gorse, briars, etc. It has been found additionally effective on certain types of weeds when mixed in equal proportions with 2:4-D.

Both products are suitable for pre-emergent weed control. This is done by spraying the freshly tilled soil soon after the planting of crops so that weed seedlings, which are mostly near the surface, are killed as soon as they germinate and begin to sprout. The deeper sown and hardier crop seedlings, however, push through virtually unaffected.

**Pentachlorophenol.** This is a general non-toxic weed killer for use where it is required to destroy all vegetation. It has found wide application for inter-row weeding in such crops as sugar cane, pineapples, etc. As a pre-emergent weedicide, it is used to destroy weed seedlings as they germinate without affecting the later developing crop.

#### INSECTICIDES.

"Niran" is the Monsanto brand

name for the newly-developed chemical product, O. O. Diethyl-p-nitrophenyl thiophosphate, known generally by its American generic name of "Parathion." Of German origin, this single product has the widest killing range of any commercial insecticide and may be regarded as the pre-eminent successor to D.E.T. — except for use with livestock.

Providing in one spray control for the multiplicity of insect pests for each of which a separate spray was needed prior to its discovery, "Niran" has been applied successfully to the control of red spider, woolly aphis, San Jose scale and a number of other scale and mite infestations.

**Pentachlorophenol.** Second only to the destruction of crops by insect pests are the losses sustained by farmers owing to damage and depreciation of fences, barns and general farm buildings by the various wood-consuming insects.

Pentachlorophenol, in addition to its weed killing properties previously mentioned, is particularly effective for the preservation of all timber structures from termites, borers, general rotting, decay, etc.

**FUNGICIDES.** Fungus growths have been an additional source of loss to the agriculturist, their effect being no less serious in that they most frequently attack farm and plantation products after harvesting.

To control this growth, the non-toxic fungicides, Fungisal O and Fungisal W, have been developed for use with oil or water mediums, respectively.

Having Salicylanilide as their active constituent, their chief application has been for fungus control of foodstuffs, such as dried fruit or certain types of fresh fruit, all of which can be made highly mould resistant without impairing their food value in any way. They can also be used to control mildew growth on plants such as tomatoes, and in the treatment of packing materials used in shipping agricultural products.

#### CONCLUSION.

While this article has been able to deal with one section only of this Company's activities, the leading part played by Monsanto Chemicals (Australia) Ltd. in the establishment and growth of the Plastics and Chemical Industries in Australia has been amply covered in previous issues of the "Australasian Manufacturers' Annual." It is pleasing to record, therefore, the constantly increasing reliance of Australian manufacturers as well as agriculturists on the products of this great enterprise, and to know that this progress has been aided, in no small measure, by the excellent technical and advisory service made available to all clients.



Destruction of blackberries and roadside brush with 2:4:5-T.



Turnip weed infestation in oat crop. Strips sprayed with 2:4-D show complete destruction of weed.

(Photo by courtesy of "The Leader")



# ICI ANZ PRODUCTS FOR ENGINEERS

*Engineering processes in which ICI ANZ products find application:—*

**METAL DEGREASING** Chlorinated Solvents—TRICHLORETHYLENE: PERCHLORETHYLENE.

Alkalies—TRISODIUM PHOSPHATE: SODA ASH: CAUSTIC SODA:

I.C.I. ALKALINE DEGREASING AGENTS.

Wetting Agents—"LISSAPOL" N.300: "CALSOLENE" OIL HS.

Cleaning Oil Tanks in Ships etc.—"LISSAPOL" N.300.

**HEAT TREATMENT OF METALS (FERROUS & NON FERROUS)** "CASSEL" Brand SODIUM CYANIDE and prepared HEAT TREATMENT SALTS for Carburising, Nitriding, Annealing, Hardening, Quenching, Tempering, Austempering, Martempering of Carbon, Alloy, and High Speed Steels, and Non-ferrous Metals, and Alloys by molten salt bath methods.

**WELDING** FLUXES.

**FOUNDRY WORK** SODA ASH for Desulphurisation and Dephosphorisation.

**GALVANISING** AMMONIUM CHLORIDE FLUX.

**TINNING, SOLDERING** AMMONIUM CHLORIDE and ZINC CHLORIDE FLUXES.

**ELECTROPLATING** "CASSEL" Brand CYANIDES; WETTING and BRIGHTENING AGENTS.

**PREPARATION OF METAL SURFACES FOR PAINTING** PHOSPHATISING.

**METAL PICKLING** HYDROCHLORIC and PHOSPHORIC ACIDS, "F" PICKLER—A restrained acid Pickling Agent; "GALVENE" and "STANNINES"—Acid Pickling Bath Restrainers.

**SCALE REMOVAL** From Boilers, Water circulating systems etc., "NORICENE"—A restrained acid Descaling Agent.

**WATER TREATMENT** Prevention of scale and corrosion in boilers, condensers, hot-water systems etc., by the "ALFLOC" system of WATER TREATMENT. Purification and Clarification of water supplies—CHLORINE, SODIUM HYPOCHLORITE, "CHLOROSENE", SODIUM ALUMINATE, FERROUS SULPHATE. Sewage Treatment—CHLORINE, FERRIC CHLORIDE.

**METAL SMELTING, REFINING & DEGASSIFICATION** SODA ASH for Desulphurisation and Dephosphorisation, CHLORINE for degassing Aluminium Alloys and Refining precious metals.

**REFRIGERATION & AIR-CONDITIONING** METHYL CHLORIDE, SULPHUR DIOXIDE and "ARCTON" Brand Refrigerants. CALCIUM CHLORIDE for Refrigeration Brines.

**FIREPROOFING** "FASPOS" for fireproofing wood and textiles.

**BUILDING & CIVIL ENGINEERING** CALCIUM CHLORIDE for shortening setting time, hardening and waterproofing concrete. "LISSAPOL" N.300 and "LUBROL" W for improving workability of concrete mixes. "APHROSOL" FC for foam concrete.

**IMPERIAL CHEMICAL INDUSTRIES OF AUSTRALIA & NEW ZEALAND LTD.**

MELBOURNE

SYDNEY

BRISBANE

Agents: Elder, Smith & Co., Adelaide and Perth.

Chemical & Textile Agencies Pty. Ltd., Hobart & Launceston.

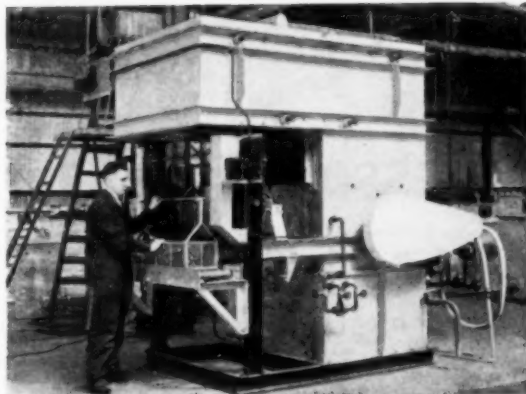


C.B.D.





Heat treatment furnace using "Cassel" salts.



Conveyorised trichlorethylene degreaser for mass-produced small metal products. Another sample of the use of this versatile solvent.

## CHEMICALS FOR INDUSTRY

### ICIANZ SERVICING AUSTRALIAN MANUFACTURERS

IMPERIAL Chemical Industries of Australia and New Zealand are manufacturers and suppliers of a vast number of chemical products that are the raw materials used in a great variety of industries. To meet the ever-expanding demand for existing and new chemicals, ICIANZ' highly-qualified research chemists keep in touch with industries' requirements and are continually adding to the Company's list of available products for the Australian manufacturer.

BY way of illustration, some examples of the value of "Icianz" chemicals in industry are given below:—

**CHLORINE:** This yellowish-coloured gas was discovered almost two hundred years ago, but it is only within the last forty years or so that it has been possible to overcome its extremely corrosive properties and handle it easily. This has been done by thoroughly drying the gas and then by the combination of pressure and cold to convert it to a liquid, in which form it comes to industry in the familiar yellow steel cylinders. Thousands of tons of this gas in Australia alone are made each year by passing an electric current through common salt dissolved in water. Perhaps the best-known use for chlorine is for bleaching cotton, wool and other textile fibres. It is not well known, perhaps, that such common objects as white paper, many plastics, synthetic rubber, modern insecticides like D.D.T., and medicines, including the now famous sulpha drugs, could not be made if chlorine were not available. It is used also in vast quantities for the manufacture of all sorts of other chemicals. Chlorine is a valuable germicide and finds wide use in rendering water supplies, swimming baths, etc., safe, and, when converted to **Sodium Hypochlorite**, for keeping dairies and food plants clean and free from contamination.

**CHLORINATED SOLVENTS:** Everybody knows how difficult it is to remove grease and oil from fabrics and metal surfaces with

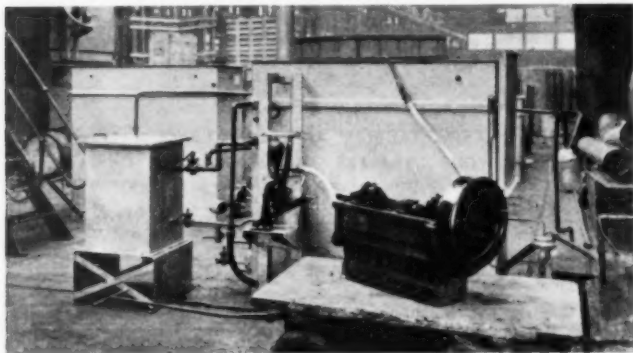
water, and even with the help of soap this is not always easy. For many hundreds of years this was the only method known until some substances were found in which oil and grease would dissolve. Examples of such substances are alcohols and solvents derived from petroleum. Both of these types of materials have the disadvantage of being extremely inflammable. By treating certain hydrocarbons—for example, acetylene—with chlorine, substances known as "chlorinated hydrocarbons" are produced which have greater power of dissolving grease and which will not burn. The most useful of these chlorinated hydrocarbons are "**TRICHLOROETHYLENE**" and "**PERCHLOROETHYLENE**." These materials are manufactured by ICIANZ in Australia.

In applying modern finishes, such as lacquers or electroplate, to metals, it is absolutely essential that there be no oil or grease on the surface, otherwise the lacquer or plate will peel off. The most thorough way of removing grease and oil from metals is to treat them with trichlorethylene, when, in a matter of seconds, or at most a few minutes, a perfectly clean, dry, grease-free surface is obtained. Another use for chlorinated solvents is the dry-cleaning of clothing and fabrics. Here again, non-inflammability is a great advantage and the results in respect of feel, brightness of colours and recontamination are superior to the other dry-cleaning solvents.

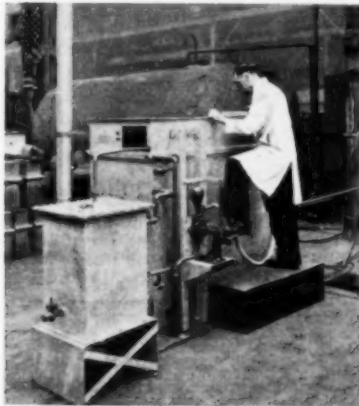
**HEAT TREATMENT OF METALS:** "As hard as iron" used to be good enough to describe how hard a piece of metal was, but modern research has shown that just how hard a piece of metal really is depends upon how and to what temperature it has been treated. Carefully controlled conditions can best be achieved by immersing the parts in baths of molten salts. The "Cassel" range of heat-treatment salts is well-known to metallurgists throughout the world. The components of these salts have been selected after extensive tests under practical conditions on a full commercial scale, so that the widest possible practical experience has been drawn upon. There is an appropriate "Cassel" product for the job, whether it be carburising, nitriding, annealing, hardening, quenching, tempering, austempering or martempering, and whether the material be carbon, alloy or high-speed steel or non-ferrous metals and alloys. I.C.I. ammonia crackers and ammonia burners are standard equipment for supplying controlled atmospheres to bright annealing and similar furnaces.

**IN SITU DEGREASING AND DESCALING:** Scale formation and oil film deposits are deadly enemies of efficient heat transfer. Wherever water is used for cooling,

(Turn to Page 269)



Rig for using "Noricene" chemical descaling agent to remove scale from the water jackets of an internal combustion engine.



Batch-type trichlorethylene degreaser cleaning car engines before reconditioning.

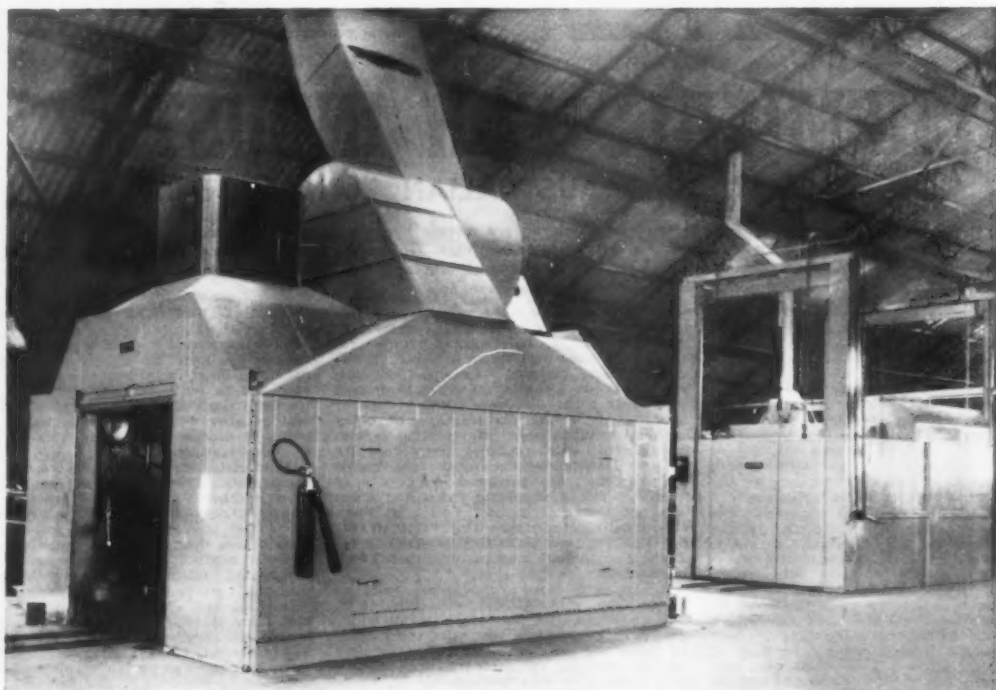


*Hurricane-*  
FORCED AIR HEATING.

## WESSBERG & TULANDER PTY. LTD.

MANUFACTURERS OF INDUSTRIAL DRYING EQUIPMENT

### SPRAYING AND BAKING EQUIPMENT



Part of car-body finishing plant at Hudson and Packard assembly plant, N.S.W.

#### WHEN YOU ARE CONSIDERING:

- **DRYING** CHEMICALS, TEXTILES, TOBACCO, VENEERS, TIMBER, CERAMICS, LEATHER, FUR, REFRACTORIES, SOAP, PULP BOARD, FOOD PRODUCTS, CONTINUOUS SHEET MATERIALS.
- **BAKING** BREAD, BISCUITS, CORES.
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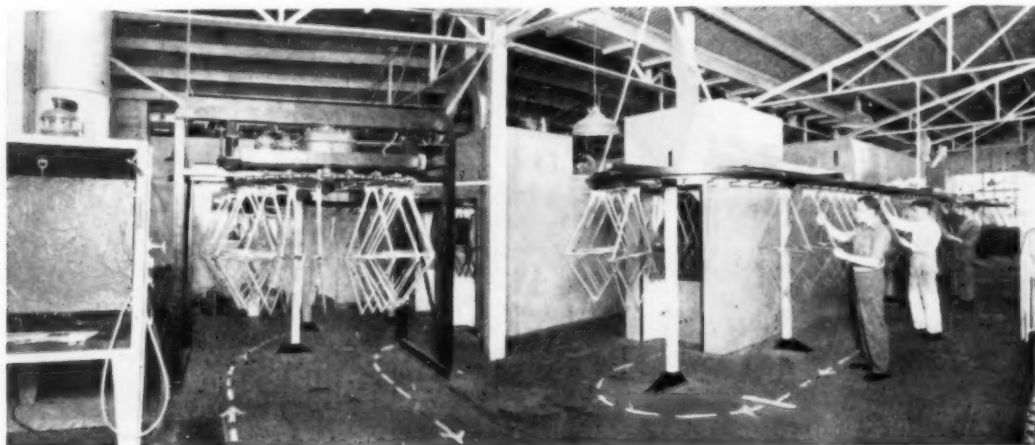
A FREE TECHNICAL SERVICE FOR YOUR INDUSTRIAL HEATING PROBLEM AND PLANT LAYOUT IS AVAILABLE—OUR WIDE EXPERIENCE ASSURES YOUR COMPLETE SATISFACTION

Address all Enquiries and Correspondence to:

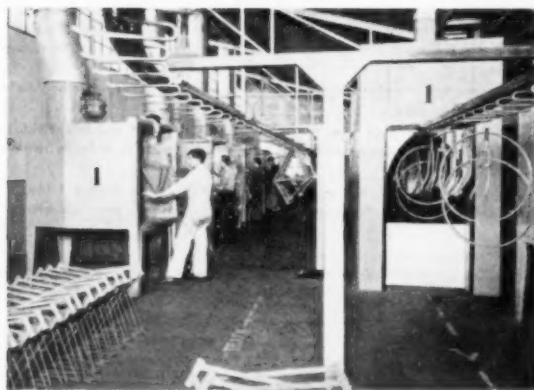
## WESSBERG & TULANDER PTY. LTD.

140-144 QUEEN STREET, ALEXANDRIA, N.S.W.

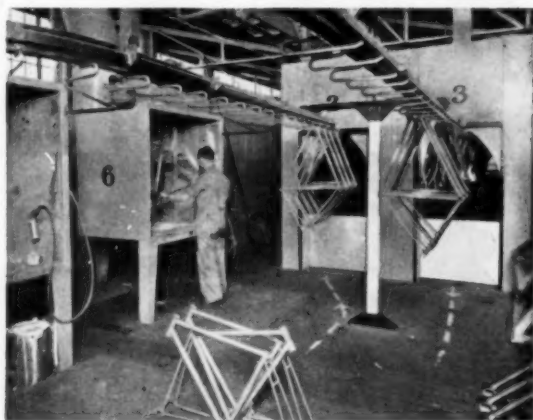
'Phones: MX 1241, MX 1552



General View of Conveyorised Finishing System.



Enamel coat being sprayed on to parts before entering far end of bake oven No. 1.



Baked enamel components receiving lacquer peaks before entering bake oven No. 2. Finished parts with final varnish coat are seen leaving oven No. 3.

## CYCLE PRODUCTION

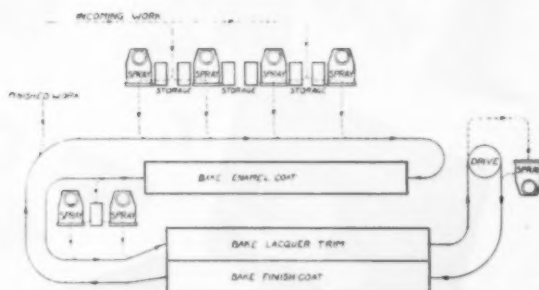
WESSBERG & TULANDER FINISHING SYSTEM  
SPEEDS OUTPUT

ILLUSTRATIONS on this page are of a "Hurricane" Finishing System manufactured by Wessberg & Tulander Pty. Ltd., and installed in the Redfern, N.S.W., factory of Bennett & Wood Pty. Ltd., cycle manufacturers.

The plant, which was designed by Mr. W. F. Keep, A.S.T.C., A.M.I.E., a Director of Wessberg & Tulander Pty. Ltd., occupies floor space only 40 ft. x 80 ft., and consists of 7 dry bench type spray booths and 3 conveyor type air recirculation baking ovens, together with overhead monorail type conveyor with automatic driving and take-up unit.

The seven spray booths are of special construction and present a smooth interior working surface. They are equipped with baffle plates to equalise the air flow and provide uniform draught across the face area. Paint spray and solvent vapours are exhausted by an 8-bladed propeller type fan. An important feature is a door at the rear which provides easy access for the purpose of cleaning paint from the walls.

The monorail type conveyor also is of special design. The weight of components, which are carried on hangers at 9 in. centres, is directly taken by pairs of rollers supported by the overhead track. In the driving mechanism the driving and take-up is integrated in order to provide for any increase in the length of the chain due to heat from the ovens or eventual wear. Mechanism is incorporated whereby the conveyor speed can be varied between 6 in. per minute and 2 ft. per minute.



Floor plan layout of conveyorised set-up for painting and baking cycle components.

One of the ovens is electrically heated (90 KW); the other two are steam heated, a feature of some importance with power restrictions ever threatening. In each oven the heating equipment is arranged in two zones, with high heat input in the first, or entering, zone in order that incoming cold components can quickly be heated to baking temperatures.

The ovens are 3 ft. wide, 6 ft. 6 ins. high, 34 ft. long. An air seal at each end prevents the escape of convected heat, and each oven is fitted with automatic temperature control. A warning bell rings and a signal light flashes to draw attention if for any reason an air circulation fan or an air seal fan should fail. Average baking time is 34 minutes. Production rate is 80 hangers per hour, equivalent to an output of 210 complete sets of cycle components per 8-hour day.



# Small Parts by the MILLION

for ELECTRICAL, RADIO, and  
AUTOMOTIVE INDUSTRIES  
*All Precision Made*  
TO CLOSEST STANDARDS OF  
ACCURACY



Mass production doesn't mean slipshod work—not in the F.G.S. factory; in the F.G.S. toolroom are tools and gauges accurate to the ten-thousandth of an inch. And constant, careful checking

means that every conduit fitting, every screw, every rivet, of any one type, is exactly alike.

That means complete interchangeability, and quick, accurate fitting—saving time and making a better job.

The illustrations on this page give some idea of the range of standard F.G.S. products available from stock—or special parts may be made to order in large quantities.

See F.G.S. first for conduit fittings, switches and switch fuses, flexible tubing, sundries for electrical installation work, rivets, cable lugs, battery clips and other small parts.

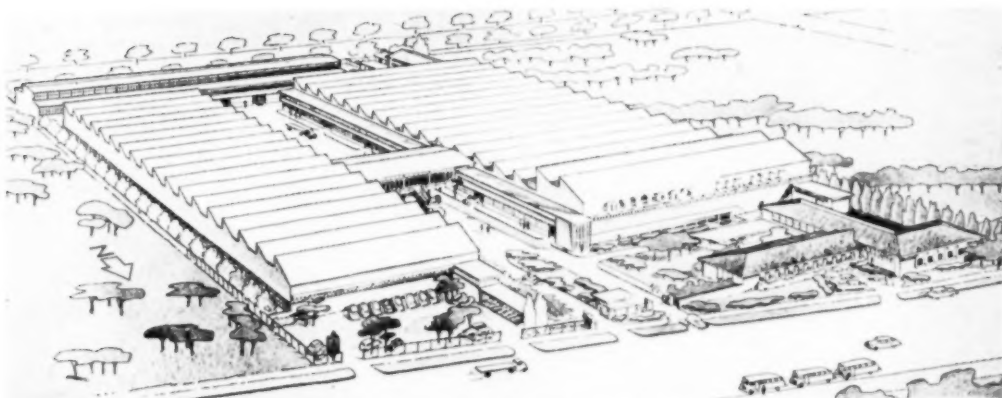
## FRANK. G. SPURWAY PTY. LTD.

EUSTON ROAD and MADDOX STREET, ALEXANDRIA, N.S.W.  
Telephone: LA 5074

INTERSTATE AND NEW ZEALAND AGENTS

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113 Eagle Street, Brisbane, Qld.  
R. C. WOOLLARD, 18 Chesser Street,  
Adelaide, S.A.  
T. W. EGAN, 75 King Street,  
Perth, W.A.  
W. BENNETT, 433 Spencer Street,  
West Melbourne, Vic.  
V. MacDONALD BRAME, 28 Collins Street, Hobart, Tas.  
J. L. GARRARD & SON, Customhouse Quay, Wellington, New Zealand.





New Factory of Myttons Limited at Fishermen's Bend, Victoria.

## MAJOR NEW ENTERPRISE IN HEAVY INDUSTRY MYTTONS LIMITED ESTABLISH HEAVY DRAWING AND PRESSING SHOP AT FISHERMEN'S BEND, MELBOURNE

**A**LREADY possessing one of only six mills in the world which produce high quality silver-ware right from the fusion of raw materials to the finished retail product, Myttons Limited recently constructed one of the largest heavy drawing and pressing shops in the Southern Hemisphere.

Designed ultimately to cover the major portion of their ten acre block in Lorimer Street, Fishermen's Bend, the first section commenced production early this year. Equipped with many mammoth drawing presses ranging from 3,000 and 1,500 ton hydraulic units, down to 1,000 ton toggle action presses, this plant will greatly extend Australia's horizon in heavy industry.

### WHAT AUSTRALIA MAKES, MAKES AUSTRALIA.

**I**N establishing this new industry, Myttons Limited have used Australian components wherever practicable, and it is an interesting sidelight on the policy of this progressive firm that, incorporated in the new premises amid garden surroundings, is a playing oval, clubrooms, and every possible amenity designed to encourage happy and efficient staff relations.

Of major interest in the production programme is a new type of all Stainless Steel Beer Barrel with much smaller outside dimensions than wooden barrels of the same beer capacity. Manufactured entirely from sheet stainless steel which is to be produced locally, these beer barrels will be virtually everlasting, while the smaller outside dimensions thus obtained will greatly extend the capacity of freezing chambers holding stocks of beer.

Another production under review is that of bath stamping, etc. Indeed, with the large presses available, a major contribution can be expected towards the replacement by the Australian-made article of many heavy stampings previously imported only from dollar sources. Already a number of enquiries have been received, and it can be confidently expected that the production of this new enterprise will take its place with any in the world.

### BALLARAT FACTORY.

As the makers of famous "Grosvenor Plate" and Silva Stainless Steel Sinks, both of which have long been accepted as equal to the world's best, Myttons Limited have made provision to provide for the big demand, both in Australia and abroad. With their South Melbourne factory working to full capacity they have, therefore, established a new plant at Ballarat.

Within three months of its inception, this factory was employing a large number of local residents and has continued steadily to increase the number of employees ever since. This policy of decentralisation is in line with the responsibility that the Directors of Myttons Limited have always felt towards furthering free Australian enterprise, and their foresight will be of undoubted benefit to the expanding city of Ballarat. It is expected that further extensions will be made in the near future.

### "GROSVENOR PLATE."

The fine reputation of "Grosvenor Plate" Cutlery continues to grow, and great credit is due to Myttons Limited for developing this high-grade manufactured ware. When it is realised that all cutlery made in Australia was formerly manufactured from imported blanks, some idea of the magnitude of the undertaking is apparent.

It begins with the smelting of specially prepared virgin Australian metals of unexcelled quality into ingots which are passed through heavy rolling mills to form strips. Cross rolling is then followed by blanking, forming and stamping operations, and finally the polishing and plating is done.

Normally any one of these processes forms a single industry in itself. Therefore, the combination of all these operations under one roof and the turning out of all types of cutlery—different varieties of spoons, fish knives, forks, butter knives, cake forks, etc.—represents a considerable triumph of co-ordination.

It must be remembered, too, that Myttons Limited also make the full range of cabinets in which "Grosvenor Plate" is sold. Con-

structed of fine Queensland timbers, these range from attractive cases for six coffee spoons or cake forks to the lavish models designed in the form of charming occasional tables with lift-up lids and drawers.

In addition to "Grosvenor Plate," which has become a synonym for quality and beauty in silverware, Myttons Limited also make "Albrite" Stainless Nickel Silver. Designed for economical everyday use, the high nickel content of this cutlery retains a bright lustre throughout, ensuring very many years of hard service.

### "SILVA" SINKS.

The "Silva" Stainless Steel Sink, which is one of the most widely known productions of Myttons Limited, is made in six standard sizes. Built of heavy gauge solid stainless steel, it is seam-welded into a one-piece unit in accordance with the specifications of the Standards Association of Australia.

The use of such sturdy material with the most modern methods of manufacture has resulted in a strong, rigid unit which will never buckle or lose shape. This eliminates the need for wood backing or tie down clips commonly used on sinks of lighter construction. With no wood to decay or conceal vermin, and no clips to break away, the "Silva" Sink unit is thus made to last a lifetime, and the new attractive satin finish, unlike mirror finished sinks, grows more lustrous with use.

In production, too, the accent has been on improved methods of manufacture, and no effort has been spared to provide machinery and apply methods capable of keeping pace with the ever increasing public demand for "Silva" Sinks.

### INDUSTRIAL DEPARTMENT.

No outline of the many activities of Myttons Limited would be complete without reference to their Industrial Stainless Steel Department.

Here one can see skilled craftsmen engaged in specialised work in stainless steel in the manufacture of high pressure steam pans, industrial cooking pans, dye vats, egg pulping equipment, and specially designed hospital units for surgical and kitchen use. Aluminium plant is also built to specification for the handling of processes where dangerous or obnoxious gases are prevalent.

This is, indeed, a very important department, and one which is rapidly expanding in production to keep abreast of Australian secondary industrial developments.

### CONCLUSION.

With progress as their watchword always, Myttons Limited are making a major contribution to the development of Australian secondary industries. While periodic journeys abroad by the Directors and technical members of the staff have kept them fully informed on the latest overseas manufacturing techniques, this Company has been quick to employ Australian ingenuity and equipment wherever possible.

With their long established manufactures making record contributions to Australian and overseas markets, and standing as they do on the threshold of vast new achievements, Myttons Limited have gone a long way, indeed, towards proving the truth of their motto: *What Australia Makes—Makes Australia.*

THE AUSTRALASIAN



MANUFACTURER

**The Bride's Choice . . .**



**MYTTONS**  
*Grosvenor Plate*



**WHAT AUSTRALIA MAKES — MAKES AUSTRALIA**

**MYTTONS LIMITED**

113-127 YORK STREET, SOUTH MELBOURNE, S.C.5

CABLES AND TELEGRAMS "MYTTON" — MELBOURNE

TELEPHONES: MX 1183-4, MX 4774-B

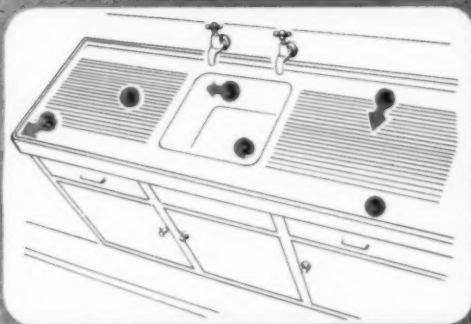


# Lovely to look at...

Makes the kitchen BRIGHTER... SMARTER... CLEANER



**These features are exclusive  
to Myttons Silva Sink Unit . . .**



- ① Welded one-piece "Silva" sink unit forming a continuous surface of stainless steel which is impervious to all food acids and alkalies and cannot affect the food.
- ② Solid drawn one-piece bowl—of greatest strength, and more conveniently sized to take any kitchen utensil.
- ③ Smoothly rounded corners and heading—no joints or crevices in which dirt and grease can accumulate. No chance of leakage.
- ④ The heavy gauge metal does not require the use of wooden backing to support it.
- ⑤ "Silva" sink unit is supplied in the New Hard-Wearing Satin Finish which does not show the imperfections of Mirror Finish.

## MYTTONS LIMITED

113-127 YORK STREET, SOUTH MELBOURNE, S.C.5

CABLES AND TELEGRAMS  
"MYTTON" — MELBOURNE

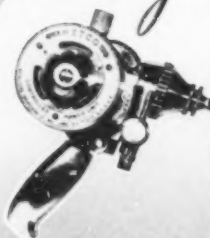
TELEPHONES:  
MX 1183-4, MX 4774-8





BROWN & DUREAU LIMITED

# Representing Industry - Serving Industry



**METCO**

**SPRAYING GUNS**  
Apply both ferrous and non-ferrous coatings to any base material. For restoration, reclamation and protection from wear and corrosion.



**KEY**

The **KEY** Hoist. A robust, reliable chain hoist which will cope with your lifting requirements.



**THE LOADMASTER**

Electric Hoist 500 and 1,000 lbs. capacity. Adaptable to all power ratings.

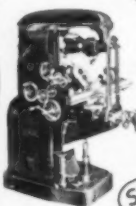
## Quality MACHINE TOOLS



Mitchell first class general purpose, medium-priced, geared Lathes, ranging from 6 in. to 12 in. centres.

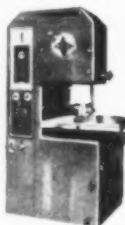
MODEL NM6.  
6 in. centre, 13 in. swing.  
MODEL NM8.  
8 in. centre, 17 in. swing.  
MODEL NM10.  
10 in. centre, 21 in. swing.  
MODEL NM12.  
12 in. centre, 25 in. swing.

**Mitchell**



**SAJO** 12 Spindle and 12 Longitudinal speeds for table. Enclosed motor. Milling Spindle mounted S.K.F. roller bearings. Inbuilt electrically driven coolant system. Standard equipment includes: universal dividing apparatus, vertical milling attachment and slotting attachment.

(SAJO)

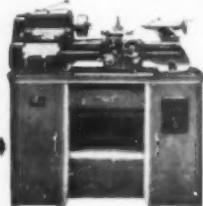


**WIDSA**

Toolroom metal Bandsaws. These machines will saw and file with speed and precision unobtainable by any other method.

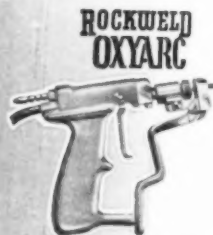
**Kerry**

5" Kerry precision tool-room lathe. Bench or pedestal models.



**SHOR-LUBE**

Self-Lubricating Sintered Bronze Bearings. There is a Shor-lube bearing to meet every Engineering requirement. Long life with minimum maintenance.



**ROCKWELD OXYARC**

An entirely new method of cutting and piercing ferrous and non-ferrous metals by a combination of the oxygen and arc-welding method. Quicker, efficient and more economical.

**Kerry SUPER**

**SPEED DRILLING**

MACHINE



**VERALOY**

Something different in Tungsten carbide tools and tips. Grades available to meet all engineering requirements.



A truly heavy duty Milling Cutter.

**BROWN & DUREAU LIMITED**

MELBOURNE - SYDNEY - BRISBANE - ADELAIDE - PERTH



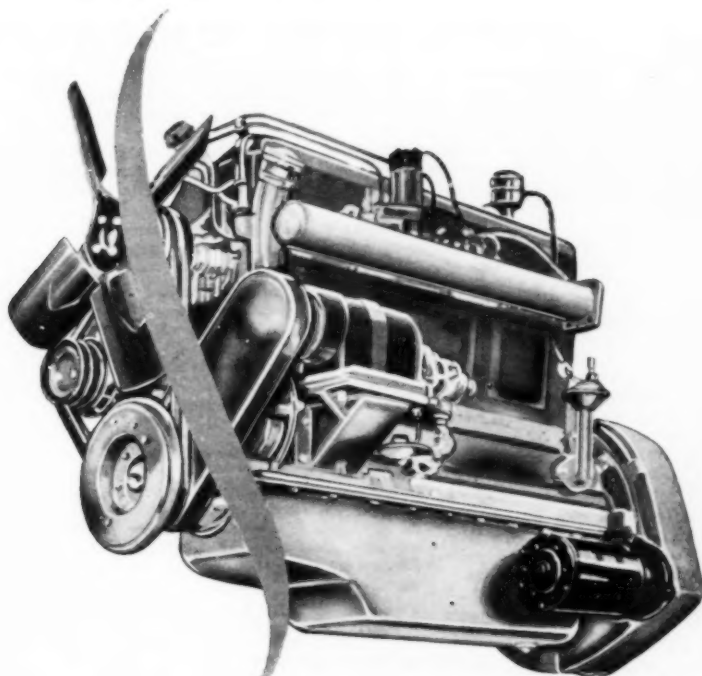


THE AUSTRALASIAN



MANUFACTURER

25 YEARS' PRECISIONEERING IN THE AUTOMOTIVE FIELD



# Engine Reconditioning

WHEN you need engine reconditioning, specify Kirby engine reconditioning, and get an Aircraft Precision job. Working to a single standard of aircraft accuracy, Kirby services, besides including every major engine reconditioning operation, embrace surface grinding, copper plating of cylinder heads, cam grinding, tin plating and anodizing of pistons, valve seat inserts, Brightway surfacing of valves, copper plating of cylinder liners and valve inserts, hard chrome plating.

Make it a plan to give your customers the benefits of a Kirby Aircraft Precision job—backed by the facilities, services and knowledge of an organisation experienced in 25 years' Precisioneering.

CYLINDER GRINDING  
MICROMATIC MIRROR FINISHING  
CYLINDER SLEEVING  
CRANKSHAFT GRINDING  
BEARING REMETALLING  
HIGH DUTY BEARINGS  
LINE BORING

**JAMES N. KIRBY PTY. LTD.**

75-87 SALISBURY ROAD, CAMPERDOWN, N.S.W.

ENGINEERS TO THE MOTOR, AIRCRAFT AND REFRIGERATION INDUSTRIES

LA 3666 (5 LINES) — LA 3371 (5 LINES)



# INDUSTRIAL LUBRICATION SURVEYS

## ATLANTIC SERVICE TO MANUFACTURERS

AUSTRALIAN industrial expansion has been remarkably rapid over the last 30 years, and no doubt would have been much greater had secondary industry not been so adversely affected during the world depression of 1929-1935. Due to such rapid expansion in secondary industry, it will be realised that planned production is of great importance and a most essential feature of such production is plant maintenance.

In the desire to achieve increased production, plant maintenance is often overlooked or treated as a subject of minor importance. If it is realised that production costs must include expenditure due to plant maintenance, the importance of correct lubrication in maintaining a plant in an efficient operating condition must be a primary consideration.

BECAUSE most machine tools and plant machinery generally will function with varying degrees of efficiency on any type of lubricant, insufficient consideration is given to the selection and application of the correct grade of lubricant specified by the manufacturer of the machine, or recommended by a competent lubricant engineer. It is false economy to endeavour to use inferior or second grade lubricants merely because they are low priced, or to apply a more viscous lubricant than is recommended in an endeavour to reduce consumption in a particular plant.

The initial monetary saving effected by using low quality, low priced lubricants is far outweighed by additional maintenance costs, due to inefficient operation. The application of too viscous a lubricant, merely to decrease consumption, can decrease machine life due to the inability of such a lubricant to reach high speed bearings. In addition too viscous a

lubricant increases power consumption by losses due to friction and thus reduces machine life.

Oil Company Lubrication Engineers are constantly in touch with engineering design and developments of Petroleum Technologists and scientists, and are, therefore, able to offer sound advice, and to provide lubrication surveys planned specifically for each individual piece of equipment in a machine shop or factory.

In every instance endeavours are made to reduce the number of grades of lubricants used in the specific plant to a minimum, thus ensuring less risk of mistakes occurring in the lubrication of machines by the operator or employee entrusted with their lubrication. This survey is supplied without cost to the user.

Machine tools and most mill machinery are

now operating at higher speeds and closer tolerances, and as a consequence greater attention is necessary to the methods of lubricant application. Lubricant losses are being reduced by the utilisation of sealed housing, enabling bearings to be subjected to higher pressure loadings. A study of these factors, therefore, will make one realise how important the selection of correct lubricants can be.

Mineral Lubricating Oils which are insufficiently refined, or from which all impurities are not extracted, or which are not inhibited to care for specific conditions of operation can, under certain circumstances, deposit sludge and varnish and can cause corrosion of highly machined bearing surfaces, with a consequent ultimate lubrication failure and eventual breakdown. On the other hand, highly refined Lubricating Oils, correctly applied, will assure trouble free operation and their useful life is many times that of the less costly product.

Where machines are required to operate under loads in excess of manufacturers' recommended maximum, it may be necessary to use Extreme Pressure Lubricants with proven stability and the use of such Lubricants have shown their value in maintaining both machines and production schedules. In such instances, however, it is advisable to consult an Oil Company Lubrication Engineer so that a satisfactory lubricant may be recommended.

Modern forced feed circulating systems have made it possible to use a lighter viscosity oil than has previously been the practice, with consequent improved lubricating value and reduced frictional losses. It is generally advisable, therefore, that the lightest possible lubricant commensurate with safety should be applied wherever practicable. Again, oil lubrication is more positive than grease lubrication, and wherever possible lubrication systems should be designed to use oil rather than grease.

A specimen page of a Lubrication Survey for a typical machine shop is reproduced herewith, as an indication of the type of surveys Atlantic Union is making available without cost and obligation to industry.

### ATLANTIC LUBRICATION SURVEY.

COVERING		DATE		No.	
EQUIPMENT (LOCATION AND NAME)	PARTS LUBRICATED	RECOMMENDED LUBRICATION BRAND NAME	METHOD	LUBRICATION SCHEDULE	GENERAL REMARKS
LAMBDA TOOL CO., WINDSOR, COVING GRINDERS No. 1475 2P & 1P	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	ALL GRADES NORTH OIL, 90	DRIFT CUP	DAILY	
	SPINDLE & HEAD- STOCKS	TEROSOL 50	SPRAY	DAILY	
	ALL OILS SUPPLIES	Oil GRADE No. 2	SPRAY	DAILY	
DUNN & SONS, MILLERS MACHINE No. 24	SPINDLES	BALL BEARING OIL 60	PREPARED	EVERY THREE MONTHS	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
DUNN & SONS, ADVANCE LATHES No. 1000	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
ADAMSON, BARNOL, GRILL (AVIATION SPINDLES) Type Lat 5 & 6 No. 600	SPINDLES	BALL BEARING OIL 60	PREPARED	EVERY THREE MONTHS	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
WILSON, PTY. LTD., COVING LATHES	SPINDLES	BALL BEARING OIL 60	PREPARED	EVERY SIX MONTHS	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	
	SPINDLES	TEROSOL 50	SPRAY	DAILY	
	GEARBOXES	TEROSOL 50	SPRAY	DAILY	

THIS SURVEY SHOWS THE CORRECT LUBRICANTS FOR YOUR EQUIPMENT

WITH REGARDING, PLEASE USE RECOMMENDED GRADES AND TYPES ONLY.

### FIFTY YEARS OF REFRIGERATION ENGINEERING

(Continued from page 166)

freedom from detrimental effects on the liquids being cooled.

Standard Condensing Units are not used with these Flow Coolers, but a special range has been developed so that each individual requirement can be met to give just the right amount of heat absorbing capacity. Flexible in their speed range, these units are also equipped with varying Condenser sizes so that facilities are available for the dissipation of the heat absorbed without developing excessive head pressures, which would result in inefficient and costly operation.

#### DIMCO SECTION.

Since the last edition of this Annual, considerable progress has been made with the production and application of Werner-Dimco Fin Coiling.

Installations have been made in such places as Apple and Pear Storage Chambers,

Butchers' Rooms, Dairy holding Chambers, Air-conditioning Units, etc., and excellent results are reported by users. Forced and induced draft units are available to give maximum refrigerating effect in a minimum space and finned surface pipes are particularly applicable where bare pipe surfaces may be too bulky. Another fact which should be stressed is the cleanliness and long life of the non-corrosive outer surfaces formed by aluminium fins cast on a galvanised pipe.

Werner-Dimco Fins can be supplied in lengths up to 12 feet which may be welded together to give a continuous line throughout any chamber. They may be used on direct expansion, flooded ammonia or brine circulation systems.

#### STANDARD AND CUSTOM BUILT REFRIGERATION.

In addition to the above developments, R. Werner & Co. Pty. Ltd. continue to supply standard and custom built Ammonia Compressors from 1-ton to 150-ton capacity for

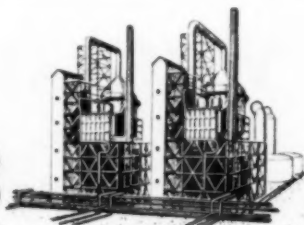
the Australian and overseas market. The Compressors in most demand are vertical, enclosed, single-acting type from 3 inch single to 4½ inch twin-cylinder in the splash lubricated type, and from 8 inch to 14½ inch x 14 inch in the forced lubrication type. In the larger sizes, double suction, multiple effect, capacity control and two stage type compressors are also available.

In the low pressure Methyl Chloride and "Freon" field, they manufacture a complete range of air- and water-cooled condensing units and compressor units from 1/3 h.p. to 5 h.p. of twin-cylinder construction, and from 7½ to 10 h.p. in V4 cylinder construction. Werner compressors and condensing units can be balanced with any low side equipment.

In closing, it would be well to note that R. Werner & Co. Pty. Ltd., in addition to their own enormous range of standard and custom built commercial and industrial refrigeration equipment, also holds the Victorian franchise for the famous Charles Hope range of domestic refrigerators.



# BACKED BY THE WORLD'S OLDEST AND LARGEST REFINERS



As modern as service can make them—as traditional as the seventy odd years' research that produced them, Atlantic products are designed to do a *real* job. Industrialists, transport operators, farmers and private car drivers have come to trust Atlantic for quality. No wonder, for every one of Atlantic's full range

of products is proved in use a thousand times a day.

You, too, can trust Atlantic for your requirements, for every product that bears the Atlantic brand is backed by the world's oldest and largest refiners.



FOR QUALITY TRUST

# ATLANTIC

ATLANTIC UNION OIL COMPANY LIMITED



# "WURKREST" Factory Equipment

*costs less than tired workers*

"Worker fatigue" costs are unnecessary . . . install "WURKREST" steel work tables and chairs and increase efficiency and staff satisfaction.



MANUFACTURERS EVERYWHERE look to us for STEEL TABLES for CUTTING, PACKING, FOOD PROCESSING, etc. Years of experience in building our special line of steel-frame tables for all requirements has secured for manufacturers the greatest factory efficiency. Tables are sectional to permit quick installation and easy portability. Legs are set back and adjustable for easy levelling on uneven floors.

Steel, masonite or wood tops.

"WURKREST" STEEL CHAIRS give freedom of movement, back support and comfort, thus increasing productivity.

*Standard type as shown—or with rubber-cushioned feet.*



*Illustration at left shows section of a factory with cutting tables to carry CLOTH SPREADING MACHINES.*

## Designed for Efficiency and Comfort . . .

WURKREST is also the modern name in furniture for  
CANTEENS, FACTORIES, OFFICES, RESTAURANTS, Etc.

Two Hundred WURKREST canteen chairs and forty tables supplied by Factory Equipment and Engineering Pty. Ltd. for use in the Ballroom at Riverview.

Chairs are of natural toned polished coachwood on frames of half-inch round section cream lacquered steel. A hinged back and rubber cushioned feet ensure comfort and efficiency.



*Consult us also for:*

**LOADING PLATFORMS**

★ *Prices are reasonable.*

**MOTORISED MACHINE STANDS**

★ *Your enquiries are solicited.*

# FACTORY EQUIPMENT & ENGINEERING

PTY. LTD.

20A CITY ROAD, SYDNEY, N.S.W. - - - MA 3980





# DUREX TAPES

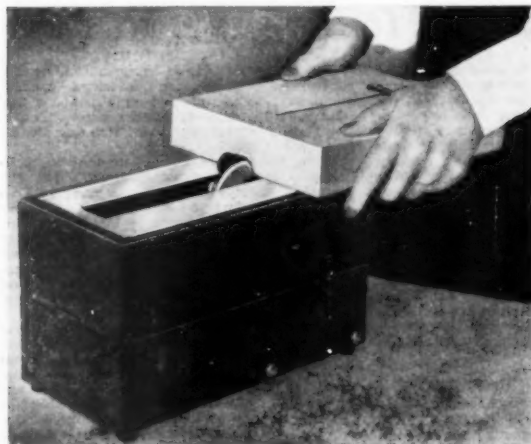
TRADE MARK  
BRAND

Whether it is a sealing, holding, mending, protecting, insulating, or packaging job, there is a "Durex" Tape to do it better. "Durex" Tapes have dozens of uses in every shop, office or factory—check now to see how many of these time-saving "Durex" Tapes you need! A "Durex" representative will be happy to call to discuss your individual problems with you.

WRITE OR 'PHONE AUSTRALIAN DUREX PRODUCTS PTY. LTD., NYRA'G STREET, LIDCOMBE, N.S.W.



TEL.: UX 6941



## THE "DUREX" BOX SEALER

Seals boxes, packages, bags with "Durex" Transparent Tape instantly—without moistening.

Here's the new speedy way to seal; the "Durex" Box Sealer automatically unwinds and indexes a definite length of clear, strong "Durex" Tape in position for successive applications. Many products are already being sealed in cartons, bags, and boxes with "Durex" Tape. It fastens securely, yet does not detract from package design. You, too, can save time and money with a "Durex" Box Sealer.



- "Durex" Electrical Tapes
- "Durex" Masking Tape
- "Durex" Acetate Fibre Tape
- "Durex" Edging Tape

have all been designed to help you with your specific need. Get to know these tapes. You will be amazed at the number of uses for them. Enjoy increased profits made possible by faster production with "Durex" Tapes.



## PRESSURE SENSITIVE TAPES

(their uses and possibilities...)

By W. D. HURD, Managing Director,  
Australian Durex Products Pty. Ltd.

Prior to the war "Durex" Brand Pressure Sensitive Adhesive Tapes and "Durex" Brand Surface Coated Abrasives, manufactured by Durex Abrasives Ltd., Birmingham, were imported for use by Australian Industry. In the latter stages of the war Australian Durex Products Pty. Ltd. was set up, primarily to support Australia's great war effort, and another industry took its place in our expanding economy to help satisfy the increasing demand for Pressure Sensitive Tapes, Industrial Coated Abrasives and Adhesives. Originally, this Company was established for the purpose of manufacturing "Scotchwrap"—tropic proofing material used by the Armed Forces for wrapping and protecting equipment—and supplying Pressure Sensitive Tapes and Coated Abrasives to industries engaged in war production.

Since the end of the war, the Australian Durex Products Pty. Ltd. has expanded its plant facilities until today it is making Pressure Sensitive Tapes—Transparent, Coloured, Masking and Electrical—Edging and Moisture Resistant Tapes, Coated Abrasives and Adhesives, comparable to those produced anywhere in the world. The Company's present expansion programme calls for the manufacture of an even greater variety of these lines designed to meet every industrial need. These new products will be introduced into the Australian market as soon as new plant, now being constructed, is completed.

**"DUREX" TRANSPARENT TAPE.** Probably the most widely used of all the pressure sensitive tapes in Australia today is the "Durex" No. 600 transparent tape. This is primarily due to the fact that almost any sealing, holding, or mending problem either in the home, office or factory can be solved quickly and simply with this clear, strong tape that seals at a touch without moistening.

Modern packaging and production line methods have demanded a strong, transparent tape, which will seal boxes, packages, bags, etc., instantly yet will not detract from the package design. "Durex" transparent tape has been scientifically designed for this purpose. To aid in the application of tape, the Australian Durex Products Pty. Ltd. has developed the manual Box Sealer (shown in the illustration above) which is already operating successfully in many Australian plants. The "Durex" Box Sealer is available for immediate delivery at a very moderate cost.

Retailers, too, have found that "Durex" tapes have increased their profits through its use in wrapping merchandise. Because it is easy to apply—a one-hand operation from the heavy duty dispenser—articles can be wrapped or boxed faster, thus enabling the retailer to serve more customers and thereby increase sales. The wide range of "Durex" coloured tapes is also being used extensively for decorating packages, wrapping gifts, and identifying merchandise.

The uses for "Durex" tapes are truly limited only by the individual's imagination.

**"DUREX" MASKING TAPE.** Among the many different accessories used in connection with modern production painting, probably none is quite as important as pressure sensitive tape—perhaps better known to many users as "masking tape". This product has many uses other than that of protecting or shielding certain areas during spray painting operations, including sealing cans and cartons where full protection is needed; die cut stencil masks for large surfaces; masking surfaces for light sand blasting on glass; protecting chrome surfaces during buffing operations; holding doors, drawers, and other movable parts secure while furniture, refrigerators, etc., are being moved from manufacturer to distributor; and many others.

Pressure sensitive tape for general masking purposes is available in standard widths of 1/2, 1, 1 1/2, 2, 3, 4, 6, 8, 10, 12, 14, 16, 18, and 24 in. by 60-yard rolls packed in either individual boxes or bulk cartons for large users, from "Durex" distributors everywhere.

**"DUREX" ELECTRICAL TAPES.** Close study and exhaustive laboratory analysis of the uses to which insulating tape can be put in the construction and installation of electrical equipment, plus the latest in manufacturing methods,

have enabled the Australian Durex Products Pty. Ltd. to produce electrical tapes notable for high dielectric strength, resistance to corrosion, firm adhesion, and ease of application. New tapes are being tested in every field and will be on the market in the near future.

General insulation work, coil winding, and reinforcing of slot insulation with the use of the "Durex" Edger, are speeded up and simplified by the use of these tapes.

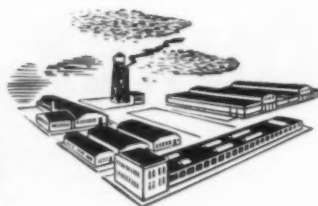
TABLE OF PROPERTIES  
"Durex" Electrical Tapes 1 and 3

No.	Type of Backing	Thickness in Mil.	Tensile Str. Lbs./in.	Elong. at Break %	Adhesion on/in.	Insulation Resistance Megohms	Dielectric Strength Kv./in.	Electrostatic Coefficient
1	Yellow Crepe	10	20	12.5	35	90	1000	.95
3	Yellow Flatback	6	40	5	50	90	1000	.95

"Durex" Electrical Tape is available in standard widths of 1/2, 1, 1 1/2, 2, 3, 4, 6, 8, 10, 12, 14, 16, 18, and 24 in. by 60 yd. rolls. Packed in either individual boxes or bulk cartons for the big user, they are available at "Durex" distributors everywhere.



# Fifty Years of REFRIGERATION ENGINEERING



THIS year marks the 50th Anniversary of the foundation of R. Werner & Co. Pty. Ltd., one of the oldest and most soundly established Refrigeration firms in Australia. Serving, as it does, a Milepost recording 50 years of solid achievement in the highly specialised field of Commercial and Industrial Refrigeration, it also provides a fitting time to herald new developments. This, the Directors and staff of R. Werner & Co. Pty. Ltd. are able to do with pride and confidence born of success in the past; PRIDE in their factory-tested and field-proven equipment of unexcelled quality, and CONFIDENCE in the knowledge that their reputation and reliability has stood the test of time. Details are given below of some of the projects under review or already in production.

THE process, variously known as "Deep Freezing," "Quick Freezing," or "Shock Freezing," was originally evolved by the American fishing industry, which found that seasonally caught fish which had been frozen down in the least possible time kept much better . . . and thawed out with more of its original flavour and quality.

The explanation of this phenomenon is that slow freezing causes large ice crystals to form from the moisture content of food, the sharp points of which tend to crush the food cells, while further deterioration occurs when these melt and the essential flavour-supplying liquids run away. Quick freezing, on the contrary, reduces the size of the crystals to a minimum and there are some foods which can be frozen so rapidly that no perceptible damage occurs at all. While we lag 5 or 10 years behind America and the rest of the world in this, the best known method of preserving the natural flavour and freshness of food, it would appear, however, that we are now on the threshold at least of quick freeze food processing in Australia.

Already a number of enquiries have been received from people concerned in a serious-minded manner in the marketing of fish, meat, fruit and vegetables for Australian consumption and for export abroad. It is felt, too, that when the initial stages of the process are overcome, increased markets will open up for Australian frozen products, particularly in the United Kingdom.

## WATER COOLING.

Water conservation has recently become one of the most important problems confronting Australian Industry and to make the most of the available supplies, many water saving devices are being introduced which, hitherto, were hardly considered necessary.

Werner Engineers have realised the importance and urgency of providing such plants, and have designed and constructed various reticulating systems of adequate capacity for cooling water used for heat removal in industry. By their use, water may be used over and over again with negligible windage

and evaporation losses (less than 5 per cent.). When it is remembered that most city water supply authorities make an additional charge over and above water rates for the discharge of waste water into sewerage systems, some idea of the savings to be made in this direction can be readily gauged.

The type of water cooling system necessary for any particular process naturally varies with the required operating temperatures of the cooling water. With their years of specialised experience in manufacturing mechanical cooling equipment for every possible purpose, R. Werner & Co. Pty. Ltd. will design and manufacture any size of Natural or Mechanical Refrigerated Water Cooling system to suit individual requirements. These range from small, compact units recirculating a few hundred gallons an hour to large custom built systems reticulating over 100,000 gallons every 60 minutes.

## REFRIGERATION IN INDUSTRY.

For many years refrigeration was used almost exclusively for the preservation of foodstuffs and it was in this sphere that the pioneer firm of R. Werner & Co. Pty. Ltd. contributed so much towards Australian progress by designing and manufacturing equipment used in the development of the Export Trade.

But if the First World War saw the general introduction of refrigeration to the food industry, the Second World War added impetus to a much wider application of the benefits of temperature control and, as before, Werners were among the pioneers in this new field.

Where articles are being manufactured to very fine tolerances accurate temperature control is often imperative, and some idea of the diversity of the problems encountered may be gauged from the fact that Werners have installed plants to accurately control, cool and/or maintain temperatures from ambient plus conditions down to minus 80° F. Their specially trained staff is always available to discuss the specific problems arising in each individual case and to suggest standard equipment or custom built plant to meet the problems peculiar to any industry.

## AIR CONDITIONING.

The field of air conditioning embracing the control of temperature, moisture content (humidity), cleaning and movement of air falls roughly into two basic groups—"Conditioning for Comfort" and "Process Conditioning."

While the Australian climate may seem to bring "Conditioning for Comfort" into the realms of luxury, there are still many spheres where the comfort and well-being of operators or members of the public makes its use imperative. "Process Conditioning," on the other hand, is a "must" in many of our growing industries where the average climatic conditions may vary in one or more factors beyond the range desired for standardisation, testing, and/or efficient production.

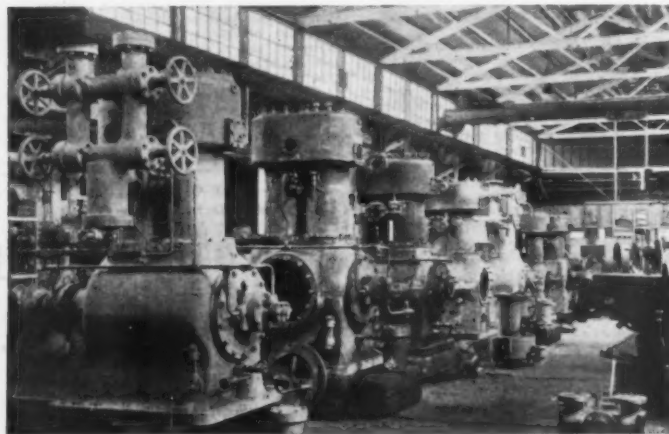
Although "Werners" have earned their prestige in the Refrigeration Field they have, in the last few years, installed many custom built Air Conditioning plants in Australia. With the experience thus gained, plans are now under way for the development of a standard range of Air Conditioning Equipment which, while designed primarily for the Australian manufacturer contending with local climatic conditions, will still be sufficiently flexible for service anywhere in the world.

## FLOW COOLER.

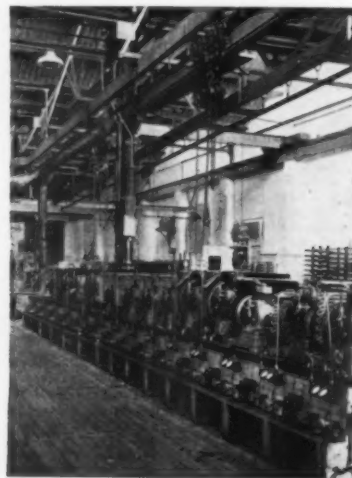
This is a trade name given by R. Werner & Co. Pty. Ltd. to their range of equipment designed to cool liquids to the most palatable drinking temperature. Used in the main for chilling beer, these plants may be used with equal efficiency for drinking water, cordials, wine, etc.

They have been developed by Werners research staff working in conjunction with the technical staffs of the Breweries and in close co-operation with hotel owners and licensees. They are built to provide efficiency in operation and positive temperature control, while retaining compactness in design and economy in initial outlay. A feature is the complete

(Turn to page 162)



Ammonia compressors under construction.

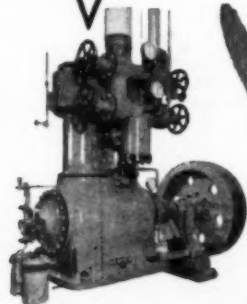


Final running in test bench for low pressure condensing units.



# WERNER

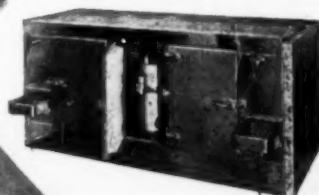
—the Oldest Name  
in the Refrigeration Industry



150 ton ammonia,  
enclosed vertical  
single-acting com-  
pressor



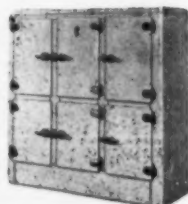
Confectioner's  
combination cabinet.



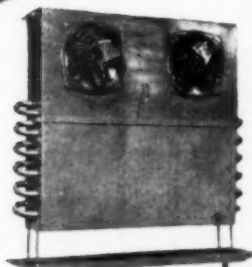
Stainless steel draught  
beer and bottle cooling  
cabinet.



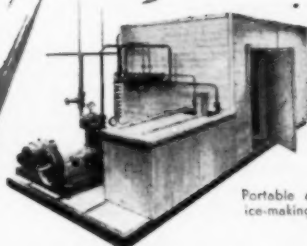
Atmospheric  
water-cooling tower.



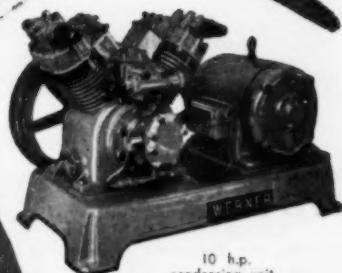
Multi-door storage  
cabinets.



Forced draught "DIMCO"  
unit cooler.



Portable ammonia  
ice-making plant.



10 h.p.  
condensing unit.

## Manufacturers of the most complete range of Refrigeration Equipment

Ammonia Vertical Enclosed Compressors: Standard Single Acting and Custom-built Double Suction, Multiple Effect, Capacity Control, Two Stage. Condensing Units—Water and Air Cooled—Methyl Chloride or Freon. Compressor Units—Methyl Chloride or Freon. Unit Coolers—for Ammonia and Methyl Chloride, etc. Condensers—Evaporative, Shell and Tube, Atmospheric. Pipe Coils—of all types and sizes. Finned Coils. Receivers. Tanks—of all types and sizes. Natural and Mechanical Draft Water Cooling Units. Cooling Towers. Chamber Doors. Chamber Door Hardware. Sectional Cool Chambers. Valves, Fittings.

Cabinets of all types.  
Beverage Flow Coolers.  
Ice Making Machinery.  
Air Conditioning Equipment.

## R. WERNER & CO. PTY. LTD.

Showrooms: 602 Little Collins St., Melbourne, MU 6461. Works: 54-86 Burnley St., Richmond, JA 1161

AGENTS:—SYDNEY: Stuart, Walker & Co. Pty. Ltd., BRISBANE: M. G. Blunt Pty. Ltd., ADELAIDE: White Engineering Ltd., (Ammonia Refrigeration); C. Darwent & Son (Low Pressure Refrigeration), PERTH: Atkins (W.A.) Ltd. (Ammonia Refrigeration),

HOBART: Noyes Bros. (Melb.) Ltd., LAUNCESTON: Noyes Bros. (Melb.) Ltd.





# 62 YEARS OF SERVICE

Manufacturing for the "Man on the Land"

SIXTY-TWO years ago the Intercolonial Deep Well Boring and Manufacturing Company Limited was formed. Since then the name has been modified to—Intercolonial Boring Company Limited—better known as I.B.C.—but the policy of the Company has not changed.

At all times it has been the endeavour of the Management to improve the quality of their products, and this endeavour is exemplified in the growth of the business.

From a very modest beginning, away back in 1888, when only a few employees were on the pay-roll, the activities of the Company have extended to such proportions that the subscribed capital is now £258,427.

WHILE a large proportion of the business of Intercolonial Boring Company Limited, of Brisbane, represents general merchandising of engineering and mill supplies, plumbing equipment, tools of trade, iron and steel, tubing and accessories, workshop equipment, etc., the manufacturing of well boring tools, windmills, water-raising appliances, irrigation equipment, lamb marking cradles, delvers, troughing, tank-stands, etc., has engaged the company's special attention.

In the firm belief that ideal working conditions enable operatives to produce quality products, the Company has spared no expense in the proper equipping of the I.B.C. Workshops, situated at Yeerongpilly, four miles from the G.P.O., Brisbane.

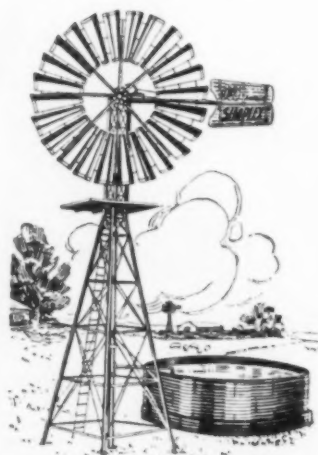
Prior to the erection of these workshops, in 1914, and their occupation in 1915, the

## PUMP HEADS.

I.B.C. twin-gear open and fully enclosed type pump-heads represent another line that has been manufactured in large numbers, and is proving very popular with the pastoralists and farmers. During the recent world war the I.B.C. totally enclosed cut-gear type pump head represented an item of war-equipment that was used for the supply of water to the troops in Australia and the Middle East. Likewise, cylinder pumps, pump rods, footvalves, float valves and the one-hundred-and-one other gadgets that are required on the many and varied pumping plants throughout Australia have been, and are being, manufactured in these workshops.

## IRRIGATION EQUIPMENT.

For many years I.B.C. has made a careful study of field and jet irrigation—so much so



Simplex geared self-oiling windmill.

still in great demand throughout Australia. This fact speaks volumes for the quality and design of the drilling tools manufactured over the years, particularly as Boring and the Manufacture of Boring Equipment was one of the first real interests of the Company over 60 years ago.

## MODERN PLANT.

All the plant in recent years has been modernised in an effort to secure precision results and to increase production in these times of man-power shortage.

Recent additions to the Blacksmith's Shop  
(Continued on page 269)



Aerial photograph of the engineering works of the Intercolonial Boring Co., Ltd., Yeerongpilly, Brisbane.

Manufacturing Department of the Company was confined to the premises located at the rear of the warehouse situated in Ann Street.

## SIMPLEX WINDMILLS.

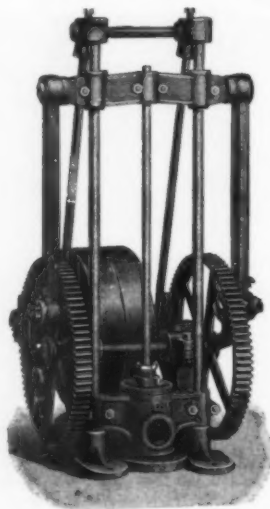
However, the change-over to the new and up-to-date workshops enabled a large range of goods to be manufactured for the "man on the land." Simplex Windmills were designed and placed into production. Since then thousands of these windmills—both in the geared and direct-acting types—have been erected on properties in Queensland, New South Wales, Victoria, South Australia, West Australia, and the Northern Territory. Because of the extreme shortage of raw materials sufficient of these windmills cannot be produced to satisfy the demand. When this lag in the supply of raw materials is "caught up" with Simplex Windmills will be readily available to both the Commonwealth and overseas market.

that the wise farmer, now by the use of irrigation equipment designed and manufactured by Intercolonial Boring Company Limited, can compensate for the deficiencies and irregularities of nature and so be assured of good crops even in dry seasons. Many cases have been recorded where in one drought year the additional income earned as a result of irrigation has more than paid for an entire I.B.C. Irrigation Plant.

The I.B.C. Irrigation Field Spray is one of the most popular of its type in the Commonwealth, while the quick-acting fittings fill the demand for high-class irrigation components. I.B.C. Centrifugal, Ball Bearing, High Duty Pumps are expressly designed for Spray Irrigation Work and hundreds of these pumps from 1½ inch to 6 inch are being turned off the assembly lines each month.

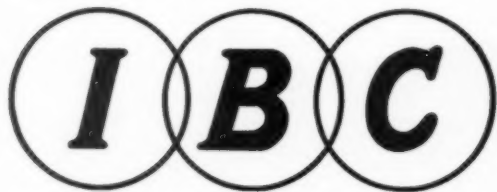
## BORING TOOLS.

Boring Tools manufactured by I.B.C. are



I.B.C. Pump Head.



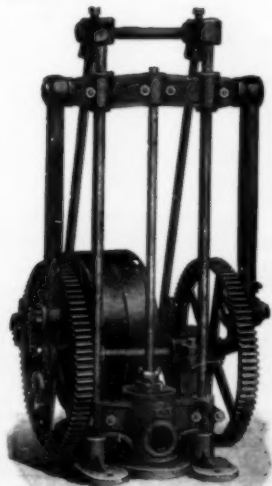


## *Manufactures all types of PUMPING and IRRIGATION Requirements*



Single Stage High Duty Centrifugal Pumps—ball bearing, high efficiency, yet keenly priced to compare favourably with any similar pump on the market.  
Made in sizes from 1½ inch to 5 inch.

*We carry comprehensive stocks of all classes of Pumping, Irrigation and Windmill Equipment, including Cylinder, Piston, and Centrifugal Pumps. Let us quote you for your requirements.*

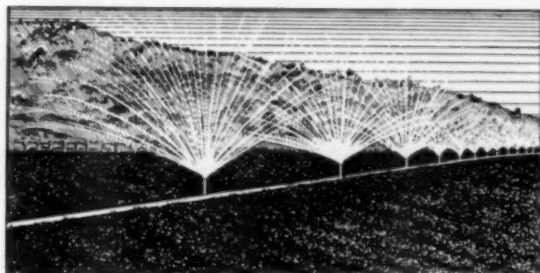


I.B.C. Pump Heads and Pump Jacks—double geared, with low or high discharge. 10, 14, and 18 inch stroke sizes. Also made in totally enclosed self-oiling types, 14 and 18 inch stroke sizes.

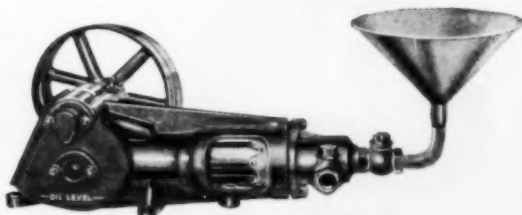
Balanced Beam Pumping Heads also manufactured.



"Simplex" Geared Self-Oiling Windmills. Sizes 8, 10, 12 and 14 feet diameter wheels with towers to suit customer's requirements.  
"Simplex" Direct Acting Windmills in sizes 16, 20, 24 and 28 feet diameter wheels, with towers to suit customer's requirement.



I.B.C. Irrigation Equipment, comprising Quick-Acting Couplings, Saddles, Gunmetal Crosses, Tees, Bends, Hose Ends, and the I.B.C. Special Irrigation Spray. All items are ready for assembly.



The I.B.C. Skim Milk Pump is the handiest little totally enclosed twin cut-gear Piston Pump on the market. Will pump 200 gallons against 200 feet head.

# **INTERCOLONIAL BORING CO. LTD.**

**Manufacturing Engineers—Merchants—Contractors**

**450-466 Ann Street • BRISBANE • Queensland**



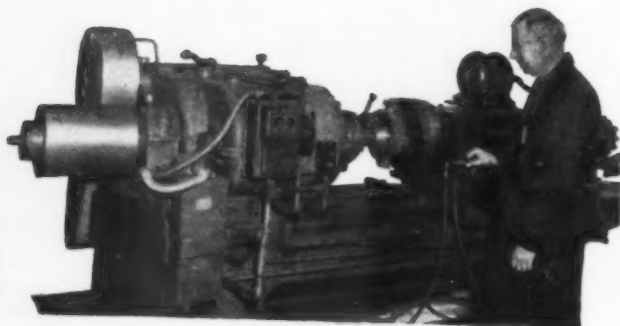
— manufacturers of "N.I.P." precision hand-tools and semi-rotary pumps now make their extensive production facilities available for **YOUR MANUFACTURING REQUIREMENTS**

Save your own and your executives' time with our complete blue-prints-to-finished-article engineering service.



Operator drilling and tapping footvalves, showing the use of a Drumobile mobile drum carrier (a National Industries product) in the foreground.

Delivery to suit your convenience can be arranged for all metal parts, food processing machines, motorisation of machinery, fire protection equipment, or display-counters, -stands, or -signs.

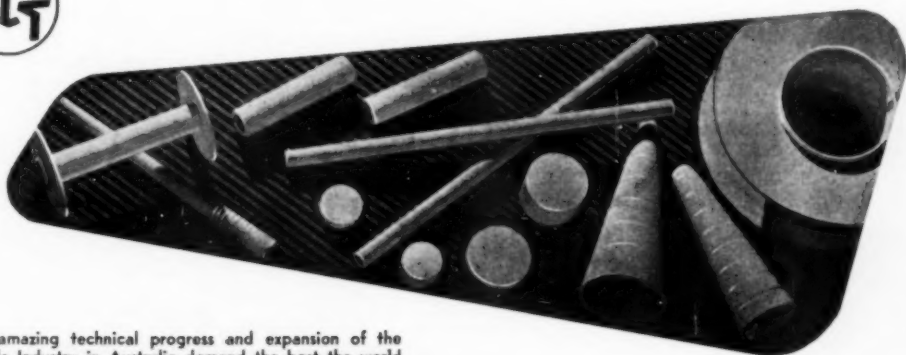


Special purpose turn-milling machine for semi-rotary pumps and similar products.

**NATIONAL INDUSTRIES PTY. LTD.**

52 O'RIORDAN STREET, ALEXANDRIA, NEW SOUTH WALES

MU 2201



The amazing technical progress and expansion of the Textile Industry in Australia demand the best the world can offer in such essentials as Paper Cones, Tubes, Pirns and Spools. We are associated with Textile Paper Tube Company Limited of England and Sonoco Products Company of U.S.A., and modern machinery and methods backed by a vast fund of technical knowledge and formulae are now yours to command.

The sales and service plan is that the requirements of the Industry in New South Wales and Queensland will be attended to by our Sydney office while Noel P. Hunt and Co. Pty. Ltd., 9-11 Hawke St., Melbourne, will cover Victoria, South Australia and Tasmania, together with New Zealand.

## TEXTILE CONES & TUBES PTY. LTD.

REGISTERED OFFICES: SYDNEY — GARDENER'S RD., ALEXANDRIA. TEL: MU 2281  
MELBOURNE — 243 SMITH ST., FITZROY, N6. TEL: JA5027

• CONES • PIRNS • TUBES • MULE COPS • SPOOLS •

AUSTRALIA'S LARGEST  
AND MOST MODERN  
STRIP ZINC ROLLING MILL



**METALS  
AND  
ORES**  
PTY. LTD.

116 BOURKE RD., ALEXANDRIA, N.S.W.



Full stocks of all types and grades of Special Steels are available through our Branch Warehouses in all Capital Cities, in all forms required for engineering and general industrial needs. Complete technical advisory service is at your disposal at any time.

# COMSTEEL

**COMMONWEALTH STEEL COMPANY LIMITED**  
**STEEL MANUFACTURERS**

*Head Office & Works: WARATAH, N.S.W.*

Branch Warehouses:

**SYDNEY — MELBOURNE — BRISBANE — ADELAIDE — PERTH**

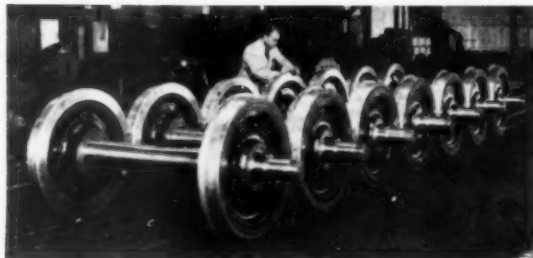




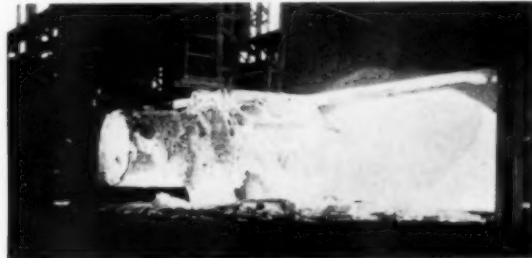
# AN INDUSTRY SERVING ALL INDUSTRY

THE growing diversity and quality of British and European exports to Australia during the past two years afford interesting evidence of the efforts which overseas industries are making to recapture markets held before the war, and the extent to which they are concentrating on an all-out export drive.

Australian manufacturers—of whom there are to-day many more than ever before—are in many cases facing keen competition, not only in their home market, but in near-by countries in which they had planned to establish post-war export markets. It is a situation which calls for a vigorous programme of production and the use of the most modern materials and methods; one which calls for the same spirit of enterprise and ingenuity which marked the early years of the war when Australian manufacturers were called upon to achieve the maximum under conditions few could have foreseen.



Roller Bearing Wheel Sets for High-speed Locomotive Tenders.



A 50-ton ingot heated ready for the production of a large forging.

TO-DAY, as in those early war years, steel is vitally important to Australian industry. Most important of all are the special steels, used in all manufacturing. Machines and tools for the production of consumer goods depend upon them; they are vital to air, sea, and land transport; to the production of raw materials. They are, in many instances, the material from which goods for the home and export markets are made.

The works of Commonwealth Steel Company Limited, at Waratah (near Newcastle), N.S.W., are to-day Australia's most important source of these essential steels. The Company produces a wide and complete range of all the steels required by industry; in addition, it manufactures an extensive list of semi-finished and finished steel products for a great diversity of needs.

It provides also a technical advisory service to steel users which has again and again proved of the utmost value. Through this department, of which there are units in every State as well as in New Zealand, the services of steel specialists are readily available to all its customers. Where new projects are contemplated, this department discusses with customers the problems to be encountered, and makes recommendations after thorough investigation. Where results from a steel user's established practice prove

unsatisfactory, a similar service is rendered, and improvements or alterations suggested.

The Company's sales organisation (through which its service facilities are available) is even more extensive. Warehouses in each capital city of the mainland carry complete stocks of all grades of steel, as well as certain types of special tools. Ready access to supplies of this nature is of the utmost value to the engineer or manufacturer who requires his material as quickly as he can get it. These supplies are naturally independent of overseas conditions, or the availability of overseas shipping. In addition, stocks are carried by the Company's merchants in Australia and New Zealand, so that the user has a wide choice of sources of supply.

## STAINLESS STEEL.

Outstanding among the many items produced at the works at Waratah are the stainless and heat-resisting steels. This is to-day a major field of activity, and is of constantly increasing importance to a growing number of Australian industries. These steels are made in a wide range of types, which cover practically all standard requirements, and there are certain other types produced especially for abnormal conditions. As the Australian manufacture of chemicals, textiles, processed foods, and similar products grows, Comsteel stainless sheets, bars, castings and forgings are increasingly employed; the established sugar, dairying and brewing industries use them extensively; and they provide the manufacturers of many types of consumer goods with a wholly satisfactory material. The Company's Stainless Steel Plant comprises sheets and bar mills, producing a full range of gauges, sizes and sections, and a large unit fully equipped with modern polishing equipment.

## TOOL STEELS AND ALLOY STEELS.

The Company produces a full range of the high-speed tool steels and carbon and alloy tool steels used by makers of special tools. These, in their manufactured form, as drills, lathe tools, reamers, milling cutters, and the like, are widely used in Australian machine shops and engineering works. So, too, are the Comsteel die-steels, the range of which includes steel for die-casting dies

and extrusion dies, as well as those for forging, stamping, or pressing. In addition, the Comsteel range of special steels includes the complex alloy high, medium and low tensile steels used in general engineering construction. These, it is interesting to note, are extensively used in the Australian-made Holden car, manufactured by General Motors-Holden Ltd., which has proved such an outstanding success since its introduction last year.

Also important are the Company's aircraft steels, which comply with all standard aircraft specifications, and have given satisfactory service both during the war and in the construction and maintenance of civil aircraft.

## FORGINGS AND CASTINGS.

A speciality of Commonwealth Steel Company Limited is the production of heavy forgings and heavy and small castings in carbon, alloy, or stainless steels. Ranging from a few pounds to many tons in weight, they are supplied for a great diversity of undertakings. Ship-building and repair is one; rail transport another; mining, dredging, bridge-building are but a few of the many other fields of engineering in which they are used. Steels for these jobs are made either by electric or open hearth processes, and foundry organisation and supervision are closely controlled to maintain the highest standards of quality.

## RAIL TRANSPORT REQUIREMENTS.

Originally, the Company was established to manufacture railway and tramway wheels, tyres, and axles, and these items still form a large part of its output. They are manufactured for all Australia's rail transport systems: for coal and metalliferous mines; and for cane-fields. Rail and tram wheels, of either disc or spoked types are made, and nearly 30 years' experience has built up an organisation versed in every aspect of manufacture and a solidly established reputation for quality in the rail systems of Australia, India, Egypt, New Zealand, and other countries bordering the Pacific and Indian Oceans.

## MINING DRILL STEEL.

An item of considerable importance is Comsteel Mining Drill Steel, the Australian manufacture of which, it is claimed, was

pioneered by this Company. Made from steel specially developed to meet Australian conditions, drill bars are produced in both the hollow and solid form, and in sizes and sections standard throughout the mining industry. Here again specialised service is available to the user, and has proved its value in many cases where unusually difficult working conditions have been encountered.

## THE COMPANY'S PLANT.

Situated adjacent to the main Northern Railway line, and within a few miles of the Port of Newcastle, the Company's Works stand on 40 acres of land. They comprise, amongst other units, a large Open Hearth Steel-making Department; an Electric Steel Plant equipped with arc-furnaces (up to 10 tons capacity); induction furnaces for the production of special steels; Bloom, Bar, and Sheet Mills; a Steel Foundry; Railway Wheel and Tyre Plant; Forge Plant, with large hydraulic forging presses, and heavy power hammers for the production of large forgings; and light and heavy Machine Shops fully equipped for a wide range of jobs.

It is an undertaking which serves many others throughout Australia and the Pacific area, and is playing an important part in the industrial development of this country—as important as it played in the maintenance of much-needed supplies during the years 1939-45.



Cast steel stern frame for an Australian shipyard.



Tapping steel from the 40-ton open hearth steel-making furnace.



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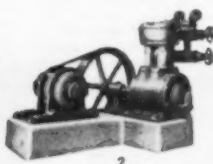
VICTORIA: Burnside and McClure, 101 Mercer Street, Geelong.

SOUTH AUSTRALIA: Bromley & Tregoning Ltd., Hurtle Square, Adelaide.

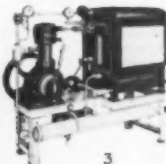
WESTERN AUSTRALIA: H. A. Cartwright, 11 Coogee Street, Mt. Hawthorn. Harris, Scrafe & Sandovers Ltd., Hay Street, Perth.



1



2



3



4



5

(1) Twin Pressure Lubricated Compressor. (2) Twin Splash Lubricated Compressor. (3) Condensing Unit with Evaporative Condenser. (4) Stop Valves. (5) Cold Room Doors.



1



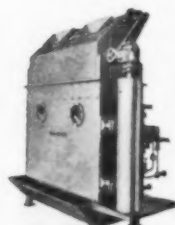
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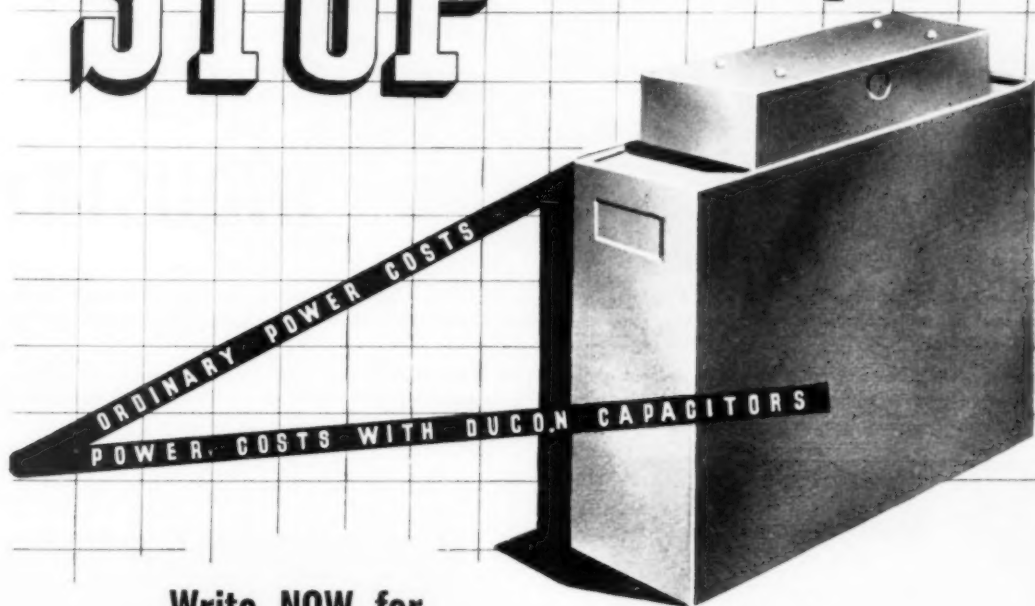
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(1) 200 ton Ammonia Condenser. (2) 30 ton Ammonia Condenser. (3) 100 G.P.M. Water Cooler. (4) 40 G.P.M. Water Cooler. (5) 10 ton Spray Type Unit Cooler.



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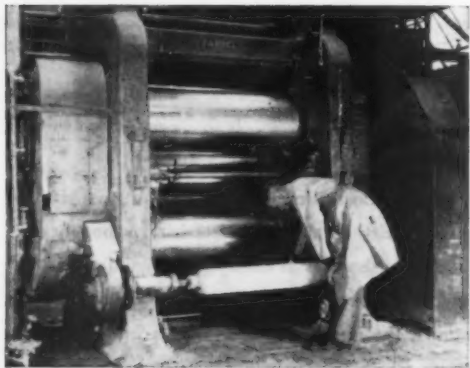
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# RUBBER IN INDUSTRY

A few men, with the common idea of building a business by backing their knowledge with team-work and a sprinkling of humour, started what has to-day become a really expansive, resourceful and productive organisation, ranking highly in the modern world of rubber manufacture.

Concentrated effort can only result in success, and out of the Leggett effort, which has been constantly developing for over 37 years, have emerged products known universally by their fitting name, "The Dependable Brand" — products which are to-day in high demand by a vast majority in both trade and consumer sections of the population.



A large calender used in the production of sheet rubber, etc.



A battery of presses in which many rubber products are moulded.



This photograph, taken in the Inspection Department, symbolises the rigid checking of dimensions of every rubber product before being passed as "finished goods."

The modern factory, Auburn Road, Auburn, E.2, Vic., in which the associated Companies of Leggetts — Messrs. AVIATION MANUFACTURING CO. PTY. LTD., AVIATION SERVICE CO. PTY. LTD., CLUB RAZOR BLADES PTY. LTD., WESTCLOX (AUSTRALIA) PTY. LTD. — manufacture their products.







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We are particularly proud of our achievements in the field of Manufactured Rubber Components, for many of today's problems confronting manufacturers have been solved by us as a result of the introduction of "Rubber Components"—

problems of design and production, of strength and weight, of speed and pressure, movement and wear . . . problems of electrical insulation and of resistance to heat.

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### INDUSTRY IN A SYLVAN SETTING

**S**ITUATED on Melbourne's famous scenic driveway, the Boulevard, the modern Rola plant is one of Victoria's industrial highlights. Rola Company (Aust.) Pty. Ltd. is Australia's principal manufacturer of loudspeakers. The Rola name has been associated with the Australian radio industry since 1930. Today 80 per cent of the Commonwealth's radio sets are fitted with Rola loudspeakers manufactured by Australians from Australian materials.

Rola Company (Aust.) Pty. Ltd. also pioneered the manufacture of magnet winding wires in the Commonwealth and is the only manufacturer in Australia offering a full range of all types of enamel and enamel and fabric-covered wires required by the electrical, radio and communications industries.

Another important phase of the activities of Rola Company (Aust.) Pty. Ltd. is the production of modern magnet alloys. First installed in wartime to meet defence needs, the magnet plant now fulfils the requirements of the Services, Government Departments and industry in general with special Ainico type magnet alloys developed by its own physicists.

**ROLA CO. (AUST.) PTY. LTD.**  
The Boulevard, Richmond, Victoria  
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It was in December, 1948, that a disastrous fire swept through our factory stopping production. But we were fortunate in so far, that at that time another factory, on the opposite side of the road, was almost completed, and is now in full production. Also, further temporary structures have been erected where production is being carried on with two shifts. In the meantime, our bigger and newer fire-proof factory on the old site is approaching completion—and will be equipped with the latest processes and machinery—so that when the building is completed immediate production of the most modern printed metal containers for every style of business in every conceivable shape will be produced. We will thank you for your enquiries for we are at present producing cans, drums, kegs, metal containers, metal printing and lacquering and are hopeful that we can fulfill your requirements. 'Phone or write for particulars, we will be quite candid in respect to deliveries.

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*Davis New Zealand Agar is available in 20-lb. canisters, packed two canisters to the case, and is distributed by the Davis Gelatine Organisation in the main cities of the following countries:*

Made from marine plants harvested from the southern seas on the New Zealand coast, Davis New Zealand Agar is famous in the world market for its exceptional gel strength and purity. This outstanding quality, achieved at the highest level of production, is standardised. Therefore the buyer, whether he buys for bacteriological work, for pharmaceutical preparations, for food production or for confectionery manufacture, makes his contract with confidence and the knowledge that only Davis New Zealand Agar could serve his purpose so well, meeting his most exacting specifications.

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CANADA

ENGLAND



# PHOTO-ELECTRIC INSTRUMENTS

## ASSIST INDUSTRY

By G. E. Tassicker, A.M.I.R.E. (Aust.), Thomas Optical and Scientific Co. Pty. Ltd.

ONE of the most satisfactory, as well as one of the most interesting, facts in connection with present-day manufacturing industry is the remarkable extent to which science is aiding every department of production. Gone are the out-moded rule-of-thumb methods of the past, and there have arisen in their stead scientific methods whose diversity, whose accuracy, and whose complexity are calculated both to astonish and to baffle those unacquainted with science and scientific principles.

To-day, the scientific approach to the important questions of industry has become imperatively necessary. As a matter of fact, it is no exaggeration to declare that the progress and development likely to be achieved by a manufacturing nation may best be gauged by the measure of its application of science to every department of activity.

This is exemplified admirably throughout the whole modern industrial world. Leader in the field is, of course, the United States of America, whose amazing production feats within recent years are explained by the nation-wide application of science to its industries. The United Kingdom is remodelling most of her industries along scientific lines, a course of action being followed in varying degrees by the manufacturing nations abroad.

Australia must do likewise. In fact, only in proportion as she does so, can she rise to, and maintain, a leading position among the manufacturing nations of to-day.

(The following article give striking examples of the diversity, indeed, of the fascinating, applications of science throughout widely scattered sections of industry—Editor.)

OVER the years quite a variety of photoelectric instruments have been designed and manufactured to assist in various ways, processes in industry. All these devices are basically dependent on the fact that when light falls on certain substances, they emit electrons, giving rise to a photoelectric current, and, therefore, any process which can be caused to vary either the brightness of light or the colour of light, lends itself to photoelectric devices to a greater or lesser extent.

### PHOTOELECTRIC COUNTERS.

Probably one of the most widely used photoelectric devices in industry is the photoelectric counter. By directing on to a photocell a light beam which is interrupted by passing objects, pulses of photoelectric current are generated, and these in turn may be sufficiently amplified to operate an electro-magnetic counter. The speed with which such objects may be counted is limited only by the mechanical design of the counter itself. A development from this is the use of a photoelectric cell in conjunction with an electronic counter, and such counters could, if required, count objects at the rate of 30,000 per second.

### PHOTOELECTRIC ALARMS.

In some particular processes, the quality of a gas or liquid passing through a flow line can be controlled by a photoelectric device. For instance, a certain liquid, yellow in colour, may be flowing along a line, and it may be required to provide an alarm should the colour of the liquid change to a brown. In this case light directed through suitable glass ports would change in colour as it emerges from the exit port, and this in turn would alter the photoelectric current in a cell placed in the appropriate position, and th. could operate an alarm or control a valve connected with the process.

Another typical application of photoelectric alarms is associated with oil fired furnaces. If a momentary block occurs in the burner of an oil fired furnace, the flame will go out and a photoelectric instrument placed at a peephole in the furnace wall can be used to switch off the oil supply, and simultaneously ring an alarm. This is particularly useful in the case of an unattended oil burner.

### PHOTOELECTRIC COLORIMETERS.

Photoelectric colorimeters are now widely used in aspects of industry requiring chemical analysis. In this particular type of instru-

ment the depth of colour of a solution is read directly on a meter connected to a photoelectric cell, and since the depth of colour is closely related to the quantity of chemical in solution, it is possible to determine with very great accuracy the strength of a solution. This type of instrument is used even more widely in research laboratories.

### PHOTOELECTRIC TURBIDITY METERS.

This type of instrument provides an accurate measurement of particles suspended in liquid, as distinct from being in solution, and a suitable light beam is directed through the liquid, and a photocell is placed at right angles to the direction of the beam. If any solid particles are present in the liquid, then light will be scattered from them in all directions, and some of the scattered light will impinge on the photocell. In this way the amount of light received by the photocell will be in direct proportion to the quantity of solid matter in suspension. Such devices can be used to determine the purity of water, cloudiness of beer, and the degree of pollution in waste water, etc.

### PHOTOELECTRIC TEMPERATURE CONTROLLERS.

Some industries, particularly the steel industry, require the instantaneous measurement of high temperatures, such as the temperature of a steel billet. In this particular case the infrared or heat radiation emitted from the hot object strikes the photocell and causes a photoelectric current to be developed. Photoelectric cells for this application require to be sensitive to the infrared part of the spectrum. The particular virtue of a photoelectric pyrometer is that its response is, for all practical purposes, absolutely instantaneous. A development from this instrument is a photoelectric temperature controller for precisely controlling the temperature of objects being flame hardened. In flame hardening processes the precise instant at which quenching should take place is most critical, and a recently developed instrument of this nature gives control to plus or minus 5 degrees C. at a temperature of 800-1,000 degrees C.

### PHOTOELECTRIC REFLECTION METERS.

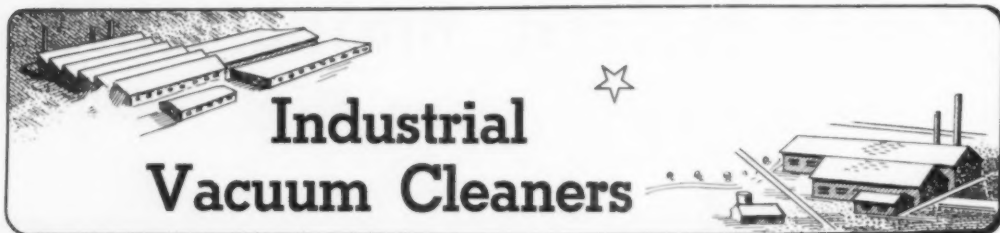
Whereas colorimeters are designed to measure and compare depths of colours and liquids, reflection meters serve the same pur-

pose with solid objects. A light beam is directed on to the surface whose colour is to be measured, and the light reflected from the surface falls on to a photocell, and the photoelectric current is measured with a suitable meter. In industries such as the paint industry, textile, paper, plastics, leather and printing, the human assessment of colour is always a controversial subject. It is a well known fact that some people have more red-sensitive vision than others, etc., and this causes two different observers to differ on their opinion of the colour of an object. The photoelectric reflection meter will give an accurate assessment of colour to a person who is colour blind, and industries which are dependent on the colour vision of one person for the quality of their product, can place the whole matter of colour assessment on a scientific basis. Closely allied with the measurement of colour of solid surfaces, is the assessment of their shininess or gloss, and a slightly different arrangement of the respective positions of the light beam and photocell can be used to accurately assess gloss, even though the colours of the surfaces may be widely different.

### PHOTOELECTRIC DENSITY METERS.

The assessment of the density of such things as photographic negatives, paper, etc., can be satisfactorily made by the use of an instrument closely allied in principle to colorimeters and reflection meters, and this is known as a density meter. Its application is not, of course, as wide as other instruments enumerated above, but in its own sphere, it is a most important tool, since once again, it completely eliminates errors in human judgment.

There are almost innumerable applications for photoelectric instruments in industry, and one could design such instruments to replace equipment operating on some other principle. However, the design engineer always has in mind the reliability of the equipment which he is designing, and, therefore, the most reliable type of equipment for a particular application would always be chosen. In such devices as the photoelectric alarm mentioned above for use with an oil fired furnace, it is essential that the equipment be designed along such lines that should it cease to function correctly, the furnace will automatically switch off. Well designed photoelectric control gear and instruments are taking a well deserved place in industry, and Australian manufacturers are showing a consciousness of their possibilities in that direction.



## "Sturtevant" Equipment Obtainable from L. R. W. Moss Pty. Ltd., Melbourne

THE results produced by industrial vacuum cleaners and cleaning plants depend very largely on the design and adaptability of the tools and attachments supplied for use with them. Equally important as size and shape is the convenience with which they can be applied to the work, a fact which has not been overlooked by the renowned British organisation, Sturtevant Engineering Co. Ltd.

This Company, it is said, pioneered the manufacture of vacuum cleaning equipment in England, and it claims to have placed on the market the first really efficient, satisfactory cleaner, known as the "Sturtevant" turbine.

SOLE representatives for Australia for Sturtevant Engineering Co. Ltd. are L. R. W. Moss Pty. Ltd., 12 Bank Place, Melbourne, Victoria, who report that the successful introduction of "Sturtevant" cleaners to this country was due not only to the desire for cleanliness for its own sake, but also to subtler and less obvious reasons.

For example, in industries where workers are exposed to irritation and possible infection from dusts like lead, silica, certain injurious chemicals, asbestos and other fibrous substances, experience has proved that after the installation of a properly organised system of cleaning with "Sturtevant" plant, lost time on account of illness is substantially diminished. In addition, the virulence of epidemic diseases like influenza is greatly reduced in a regularly cleaned establishment.

### CLOSE STUDY OF INDIVIDUAL PROBLEMS.

It is clear that in order to overcome industrial dust troubles, each problem must be studied on its merits. One of the first questions to be decided is whether to eliminate dust at its source by suitable suction plant, or to employ powerful vacuum machines throughout the factory for localised cleaning.

The "Sturtevant" range extends through many models—from those powered by fractional h.p. single phase motors, up to those driven by 60 h.p. 3 phase motors. Portable and stationary types are available, and there is no doubt that this range adequately covers all the requirements of modern industrial cleaning. Specialised applications in pneumatic conveying are also possible, as centralised stationary plants can be installed for the dual purposes of removing dust, litter, fluff or dirt, and for

the conveying of powders and granulated products.

### APPLICATIONS ALMOST LIMITLESS.

As already mentioned, the applications of these sturdy, reliable vacuum cleaners have been greatly extended by a number of cleverly designed tool attachments. Cleaning tools have, in fact, been perfected for almost every conceivable duty. In general, these tools are constructed from aluminium castings, gunmetal being used for swivelling connections, and all parts which are subject to wear.

Pipe and duct tools comprise a series of tools for cleaning pipes and ducts of from 2 inches to 24 inches diameter. Used in conjunction with Duralumin extension tubes, they give ideal results in overhead cleaning. Beam tools for cleaning overhead beams 3 inches to 12 inches wide; textile tools for cleaning combers, frames, looms, stenters, jacquards and carding machines; floor tools, including brush and cast iron faced types, are some of the most important of a fine range of attachments.

Miscellaneous tools such as the ingenious device for cleaning printers' type, the attachment for cleaning library shelves without handling the books, and the excellent tool for weevil and weevil egg removal, invaluable to millers and flour-room storemen, are likewise indicative of the Sturtevant Company's thorough understanding and appreciation of present day industrial cleaning needs. In short, there is a correct type of tool for every factory or workshop.

### ECONOMY AND EFFICIENCY

The systematic, regular use of vacuum cleaning in boiler houses, power generating stations and gas works effects a marked reduction in depreciation costs, and ensures that plant and equipment are kept

working at maximum efficiency. The ideal system in these establishments is the central stationary plant with fixed pipe-lines leading to strategic points in turbine and boiler houses, switch and control rooms, etc. With the development of pneumatic units, extraction of flue dust from boilers and furnaces has been reduced to a speedy and economical operation.

"Sturtevant" combined multi-stage turbo-blowers and industrial vacuum cleaners are widely used for removing dust, both by blast and suction, from electric motors, generators and switch-gear. The accessible portions of such equipment can be cleaned by suction, but the dust in windings must be removed by air-blast. The turbo-blower delivers a large volume of air at high velocity through a nozzle of ample size, giving a sustained air-blast over a much longer distance than is obtainable with the small volume, high pressure pin-hole jet of the ordinary air compressor.

As there is no internal contact between the impellers and the casings of this internationally renowned turbo-blower, no oil is required internally; thus it delivers a clean, dry blast. "Sturtevant" turbo-blowers and exhausters are noted for their efficiency, lower maintenance and longer life, and have been recommended by consulting and electrical engineers after conclusive tests in cleaning electrical machinery.

Textile mills dealing with cotton, wool, flax, silk and jute provide a field in which the progress of vacuum cleaning has been truly remarkable. Tangible, satisfying results in labour and money saving are revealed at once. So much waste material is thrown off during the various manufacturing processes that vacuum cleaning is

the only satisfactory method of dealing with the problem. Further, it prevents spoilage of yarn and material by eliminating oily and dirty "fly" falling on to the machinery below, from accumulations on overhead structures, pipes and shafting. Carding machines also, when cleaned by the "Sturtevant" system, reveal practically 100 per cent. results with considerable saving in labour costs.

Vacuum cleaning is the practical, logical answer to the numerous dirt and dust difficulties that arise in paint and varnish shops, motor-body works, tobacco and foodstuff factories, in the clothing and leather-goods industries, and in the manufacture of paper, chemicals and asbestos.

Apart from extracting dust and foreign matter from floor coverings in situ, carpet shampooing is simplified by the use of the "Sturtevant" portable water interceptor.

### SERVICE TO CLIENTS.

L. R. W. Moss Pty. Ltd. offer generous, reliable service to all their clients. They are ever ready to place their long experience at the disposal of those who seek it, and are prepared to give demonstrations of "Sturtevant" equipment on the actual site.

All units are completely guaranteed for twelve months, both as regards workmanship and materials, and full stocks of spares are always carried.

Detailed literature will be forwarded on request to the Melbourne office or to any of the Company's representatives throughout Australia.

In conclusion, it is, indeed, profitable to remember that constant cleanliness in factories results in extra efficiency—efficiency that can be achieved in no other way.



# sturtevant

The ORIGINAL turbine-operated  
Industrial Cleaners

## cut cleaning costs!

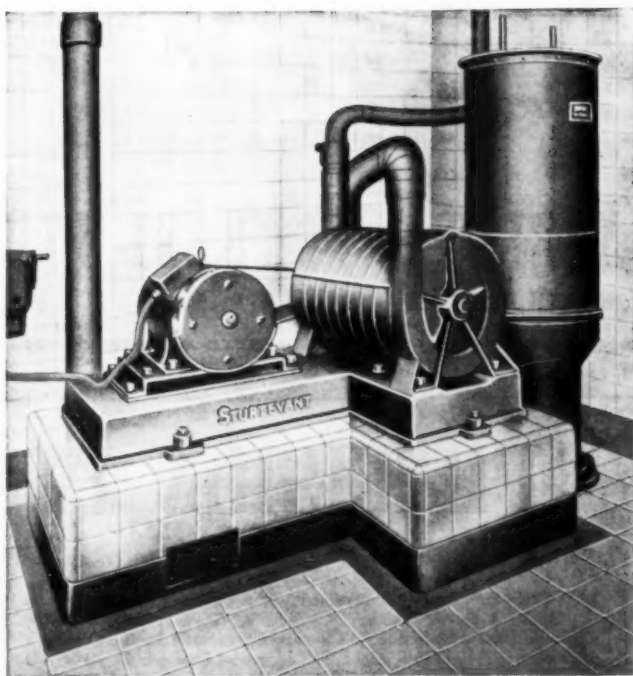
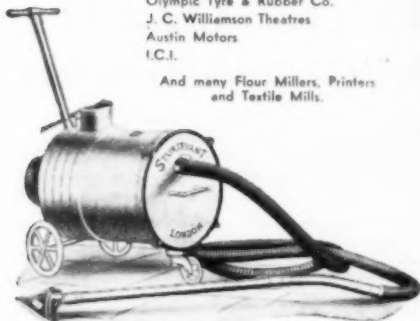
Sturtevant were first with Turbine-operated Industrial Cleaning Equipment. Today Sturtevant are still first, still best, by test—having a greater cleaning capacity with lower power consumption, and smaller cost for upkeep than any other.

Sturtevant Cleaning Equipment is currently in use in almost every country in the world in nearly all the industries using industrial equipment, factories and offices.

### PRESENT USERS INCLUDE:

T.A.A.  
R.A.A.F.  
R.A.N.  
Dunlop Rubber Co.  
Olympic Tyre & Rubber Co.  
J. C. Williamson Theatres  
Austin Motors  
I.C.I.

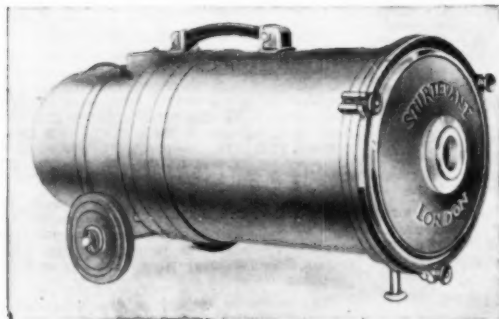
And many Flour Mills, Printers  
and Textile Mills.



### FURTHER PROOF OF STURTEVANT ECONOMY

In a large Melbourne factory recently, cleaning costs tumbled 66% after installation of Sturtevant!

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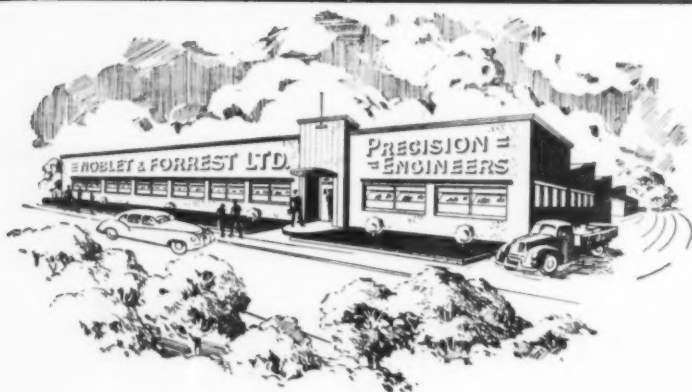
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# PRECISION ENGINEERING

South Australian Firm Specialises in Designing and Manufacturing Plant and Equipment

**V**ARYING from delicate apparatus for laboratory and scientific work to heavy equipment for all types of industry, the output of Noblet & Forrest Limited, of Woodville, South Australia, continues to cover a wide range of products.

A noteworthy production item which recently began to come off the assembly lines was a six-foot guillotine capable of cutting up to 10-gauge steel. The fortunate firms which participated in the first deliveries have been most enthusiastic regarding the guillotine's capabilities.

In Australian industry to-day, some engineering shops devote the whole of their activities to production and manufacture; some to jobbing and maintenance work, and others to jobbing manufacture. By combining these classifications, one firm can provide a most comprehensive service for its clients. Noblet & Forrest Limited, of Woodville, S.A., do this, and are proud in the knowledge that they are doing it successfully, and, incidentally, contributing to the industrial development of the Commonwealth.

**N**OBLET & FORREST LIMITED have achieved outstanding success by giving specialised attention to individual contracts, irrespective of whether the order is large or small. Having themselves made a humble beginning in the engineering industry 14 years ago, Noblet & Forrest Limited learned to respect the needs of the small manufacturer as well as the larger companies. With "service" the keyword of their activities, the firm can say there are few industries in South Australia which have not been assisted in their production by the installation of N. & F. plant and equipment.

### VARIED RANGES OF MACHINES

Adhering to its policy of first-class workmanship and using the simplest and most effective design, the Company has aimed at providing a range of machines low enough in price for the smallest manufacturer to purchase yet with the capacity and quality to take their place with the elaborate machines in large organisations.

Whilst the policy of standardisation of a machine and design has been adopted to obtain quality at a low price, the Company

also specialises in the design and manufacture of single machines required for a special purpose.

Production lines which continue to find a ready market cover plant for the woodworking and engineering trades. Various types of saw benches are included in this category and have proved very popular.

The Company introduced to South Australia, and, we believe, Australia, an all electric bowling green roller, which has been greatly sought-after by bowling clubs. Its value as a labour-saver is unquestionable, and greenkeepers have welcomed the relief from the arduous task of rolling by hand.

The drawing department is always working to capacity on the design of special equipment and plant for clients, and the Company is proud of the service it is thereby rendering to industry.

### METAL PLATE PATTERNS.

This side of the Company's activities continues to expand, and manufacturers in greater numbers are beginning to use metal plate patterns because of the better quality

castings that can be produced with their use. Experience in this field has enabled Noblet & Forrest Limited to overcome many problems encountered by clients.

### PLANT FOR TEXTILE INDUSTRY.

Because delivery date from overseas are so indefinite and currency problems so acute, the Company has been called on to provide a considerable amount of equipment for the textile industry. Having established that the plant can be manufactured locally at a competitive price, the Company is confident that considerable expansion can be made in this field.

During the year, the Company arranged for the appointment of a representative in England, who is conducting negotiations with manufacturers in that country for the Australian manufacturing rights of some of their products.

This move is typical of the progressive policy of Noblet & Forrest Limited. Their first-class workmanship will continue to lift them even higher in the esteem of the Australian industrial field.



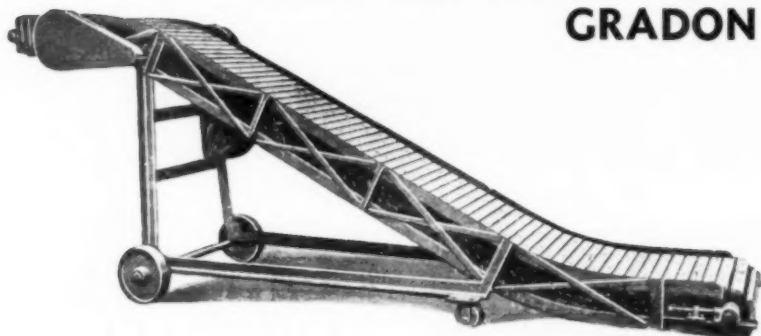


# GRADON Conveyors

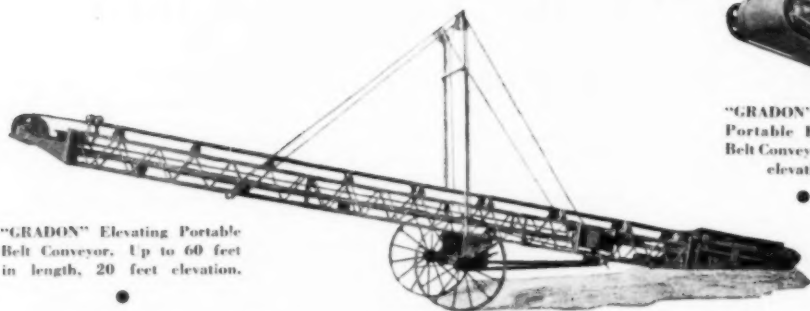
Powered and Gravity

- REDUCE PRODUCTION COSTS
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- SPEED UP GOODS HANDLING
- GET GREATER PROFITS

## GRADON Goods Escalators



"GRADON" Electric Slat Elevator, mobile, reversible, universal application for general merchandise. Convenient height for loading delivery trucks. Motion can be reversed for unloading.

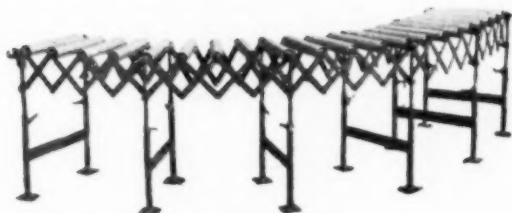


"GRADON" Elevating Portable Belt Conveyor. Up to 60 feet in length, 20 feet elevation.



"GRADON" 20 feet Portable Elevating Belt Conveyor. 9 feet elevation.

## GRADON Gravity Conveyors



"GRADON" Flexible Gravity Roller Conveyor. Variable pitch, variable radii, variable height, instantly adjustable.



"GRADON" Standard Gravity Roller Conveyor. Standard 8ft. lengths, hinged gate sections, junctions, turntables, "Y" sections, etc. Heavy duty type also available.



"GRADON" Fixed Gravity Roller Conveyor Bend with adjustable stands. Any radius. Any angle.

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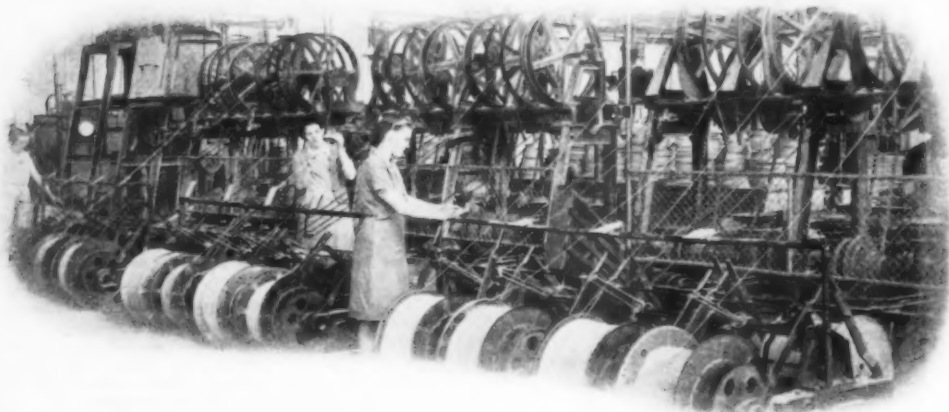


Illustration shows wire tapping operation in progress at the factory of Olympic Cables Limited, Footscray, Victoria.

# CABLE MANUFACTURE IN AUSTRALIA

## Wide Production Range of Olympic Cables Limited

THE day has long ceased to exist when near enough was good enough, for in every industry at the present time it is necessary to produce goods with rigid tolerance, to meet the specialised requirements demanded.

Olympic Cables Limited, of West Footscray, Victoria, have met these requirements and have established a substantial industry in Australia manufacturing wires, cables and flexibles used in every section of domestic and industrial life.

**FOUNDERS** of the rubber insulated cable industry in Australia, Olympic Cables Limited have, in their modern laboratory, carried out extensive research and have kept abreast of modern industrial developments in Australia and abroad, and have thus made the Commonwealth self reliant so far as the production of electric cables is concerned.

Synthetic materials are playing an important part in world progress, and are utilised to advantage in the Cable Industry for the manufacture of cables requiring particular performances.

Olympic's ever increasing range of wires, cables and flexibles now exceeds 2,000 individual types and is steadily increasing, indicating that this organisation will always be in a position to meet the comprehensive range of cable requirements of the nation.

In every household, yards of flexible cables are needed for domestic appliances, and the electric vacuum cleaner, iron, toaster or hot water jug could not operate without the flexible cable needed to convey the electric current from the power point to the appliance. Extreme flexibility and safe construction are important features embodied in these lines, for where life is endangered, the margin of safety must be beyond doubt.

Mechanisation is playing a most important part in mining to-day, and the Government, as well as individual owners, are spending large sums on machinery which will increase the output of mines throughout the Commonwealth. Each of these highly specialised electrically operated machines is supplied with power through a specially designed fire resistant

cable, capable of being dragged across the surface of a mine for long periods without damaging it in any way.

One of the most important projects being carried out in Australia at the present time is the extension of the Kingsford-Smith Aerodrome, at Mascot, New South Wales, and it is intended to make this airport one of the most modern in the world.

To complete this project it was necessary to reclaim many acres of land and to pump sand from the bed of the sea in Botany Bay and convey it through flexibly jointed steel pipes to areas of the drome site.

For this purpose electrically operated pumping equipment was

installed on a barge off-shore, and the 2,200 volts required for its operation passes through one multi-core rubber sheathed high tension cable which has been designed to operate under the most rigorous conditions. This cable is suspended at regular intervals throughout its entire length on floating pontoons and is lying continuously in salt water, thus being subjected to extreme buffeting occasioned by the high winds and rough seas existent in that area.

A tough cable is required to withstand these conditions! The trailing cable supplied by Olympic has fulfilled all these requirements.

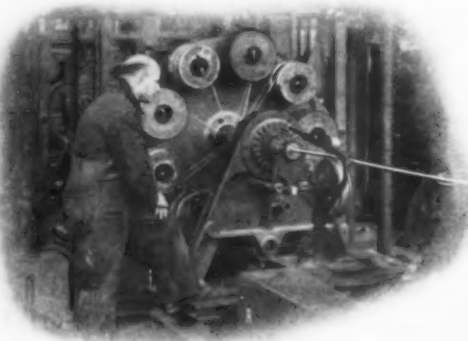
Developed and manufactured by Olympic Cables Limited is the Olympic Service Entrance Cable, a single cable from pole to house

carrying electricity for light and power installations. This well designed and balanced cable contains either 2, 3 or 4 conductors, rubber insulated, and the bare neutral conductor is wrapped in a spiral fashion around the active cores over which is applied a heavy proofed tape, together with cotton braiding and weatherproof impregnation. From the aesthetic point of view, this cable leaves little to be desired, and considerably improves the pole to house installations; above all, it embodies a safety factor which is important in protecting the lives of those people who may come into contact with such cables.

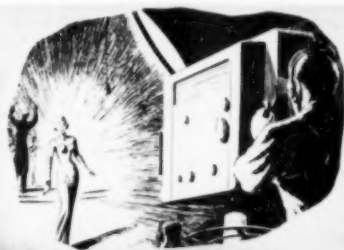
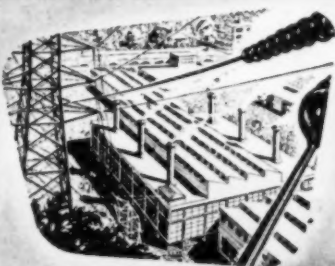
Cables required for ship building must be produced to Admiralty specifications with great care and precision in manufacture. Olympic produces these lines.

Radar, which played so important a part during the days of hostilities, is also essential for everyday use in all modern airlines and control stations, thus assuring a safe journey for those who travel in these man-made sky birds. The cables so essential for the operation of internal mechanism of aircraft are also produced by Olympic Cables Limited, whose engineers are abreast of modern developments and are able to make the cables necessary to operate television equipment, which will be part of Australia's normal requirements in the years to come.

Adequate wiring for industry and household alike is essential for the welfare, convenience and comfort of mankind, and with these factors in mind, Australia's foremost cable manufacturing organisation will continue to keep abreast of world trends and meet the ever growing demands of this nation.

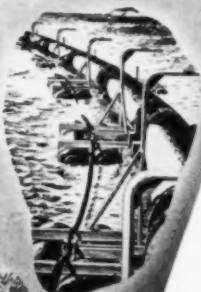
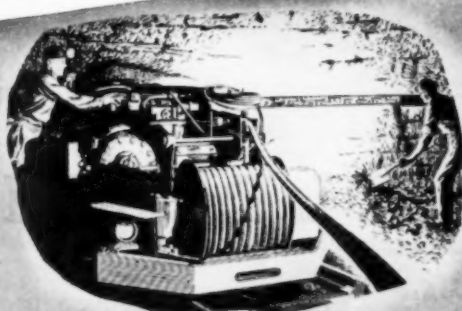
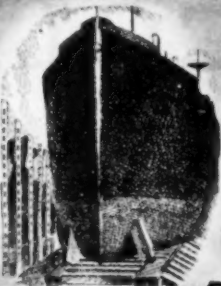


Heavy wire stranding—an operation in the manufacture of Olympic Cables.



Keeping pace with Australia's requirements . . .

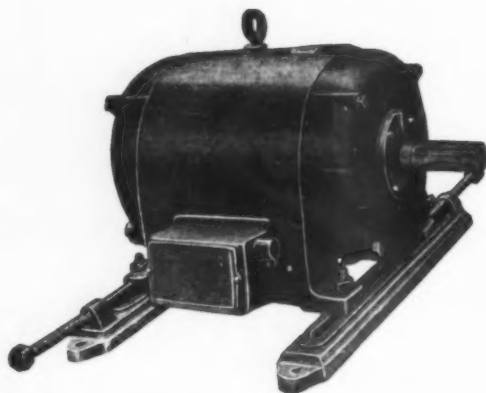
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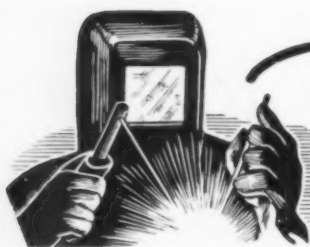
MELBOURNE

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HOBART



# Welding Developments

## PROGRESS OF THE INDUSTRY

By Wilfred T. Bennett, General Manager, Oerlikon Manufacturing Ltd., Derwent Park, Hobart.

THE fact that the word, "welding," has now become a household word, is indicative of the progress that this industry has made during the last decade. Its rate of expansion has increased enormously, as prejudice and conservative opinion have been overcome, until to-day, when few metal articles in every day use, are manufactured without the aid of one or more of the welding techniques. In the modern home we find that methods of fabrication by welding have been used to produce our stoves, sinks, refrigerators, vacuum cleaners and cooking utensils to mention but a few articles. Building to-day very often involves the use of welded structures, as do dams, bridges and many other undertakings of national importance.

THE manufacturers of welding equipment have not only to cater for the heavy engineering industry, but for a very wide market which embraces nearly every form of industrial undertaking from the farm and the small garage to shipbuilding and similar heavy constructional work. Many Australians, who are farmers, have found that to possess welding equipment is a very sound investment, since it enables them to keep their tools in repair, and in some cases increase their efficiency, as in the hard-facing of ploughs. Almost the first essential piece of equipment in the garage or small repair shop is the welding set, and operators in these small establishments are often experts in all branches of welding. Wherever the factory, and whatever it produces, a welding set of some description is usually to be found within its organisation, though it may only be required in the department of the maintenance engineer.

Although fabrication, and repair work by welding, was bound to progress, until it replaced completely many older forms of construction, the last war gave its progress a tremendous impetus and brought it to the forefront of manufacturing methods. During that period of emergency and crisis, rapid but sound methods of construction for all manner of war materials were diligently sought. Welding in all its forms received the attention of first-class scientists, and mighty projects were launched which had welding techniques as their basis. War factories were built with its aid, ships, tanks, gunnery equipment and a host of other necessary materials. It will be remembered how the Liberty Ship, pre-fabricated largely by welding, assisted to a great measure the defeat of the submarines. The formation of fleets necessary for the invasions of Europe and North Africa would never have been completed rapidly enough if welding had not been applied to the construction of the craft.

The legacy which war has left to peace, so far as welding is concerned, is the experience gained during those years, the men trained for the industry, and the immense amount of scientific research completed and capable of use for peaceful purposes. The welding industry since 1945 has not allowed this valuable work to be wasted. Advances have been made by welding manufacturers since that

date, and most companies concerned in the industry carry a staff of trained scientists for the purpose of improving quality and widening applications. As a consequence, in Australia, as well as in other parts of the world, manufacturers are continuously producing new types of machines in parallel with their own researches and they market new developments annually, to supply materials for special applications.



Mr. WILFRED T. BENNETT

This, the supply side of the industry, includes manufacturers of Arc-welding electrodes, and machines for Arc-welding, resistance welding, automatic and semi-automatic welding, in addition to the equipment necessary for all types of gas-welding. A process lately developed is used for welding plastics.

Close liaison is maintained with the consumer for two reasons. Small consumers, the man in the garage and the farmer, require advice. For this purpose, the salesman-welder will often give district demonstrations. Some manufacturers fulfil this requirement by training the small consumer in their factory welding schools. The large consumer usually employs a qualified welding engineer who will discuss his exact requirement with the sup-

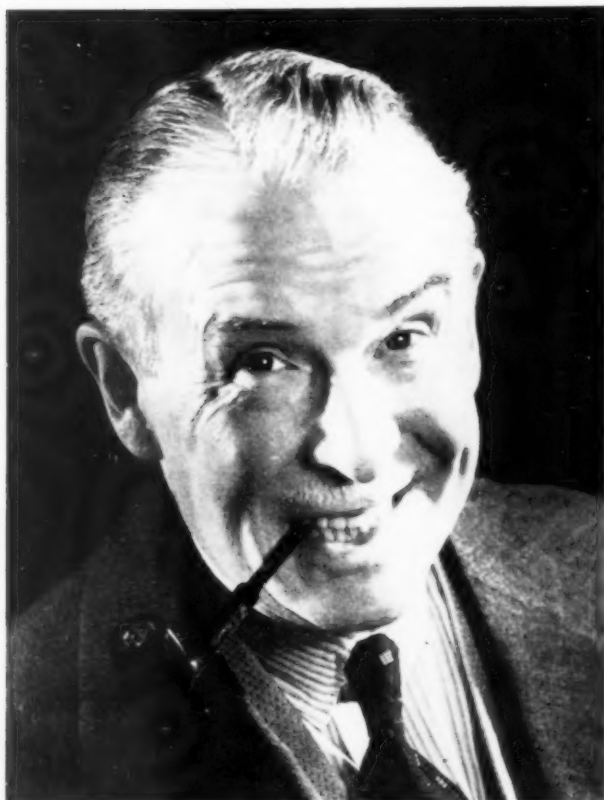
plier, who in turn will then endeavour to produce the desired type of equipment. Both these examples of co-operation are obviously of great advantage for each side of the industry and result in an ever-widening field of welding applications.

Another common ground where supplier and consumer may meet is under the auspices of the Institute of Welding. Here papers are read and discussed by members, as well as being published in their own journal. Foreign publications are usually obtained by most organisations interested in welding so that current advances abroad may be noted and investigated. It should be observed in this connection that, from such information, it is clearly shown that to-day Australian welding practice is of the highest order.

Welding should no longer be termed an art, for while good welding still relies upon the skill of the operator it is now founded upon a sound scientific basis. Accordingly, it is becoming more apparent each year that the skilled welder should have more than an elementary knowledge of metallurgy and mechanical and electrical engineering. He should understand thoroughly the structure of steel and the effects of temperature and alloying elements. Stresses and strains imposed by his operations, and the electrical characteristics of his equipment should always be the concern of the expert operator. In this connection also it should be mentioned that fabrication by welding introduces revolutionary changes in the structural engineering industry. The type of construction which, for instance, has proved efficient when riveting is used, is by no means the most suitable when welding is employed. The latter method which nowadays proves, in the majority of cases, to be the strongest and most economical calls for intelligent designing by the engineer.

As the welder is comparatively a newcomer to the ranks of tradesmen, union difficulties have been encountered, and troubles have also arisen over such matters as standards of work and degrees of efficiency. However, these difficulties are being overcome, and, as stated above, workmanship in the Australian industry equals that found anywhere else in the world.

Australia may be quite confident that its welding industry will continue to maintain its high standard. It will continue to progress, but is limited at present as are many other industries by the shortage of raw materials, but it will advance in proportion to the improvement in that situation.



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## THE PORT OF NEWCASTLE AND ITS FACILITIES

**T**HE Port of Newcastle, New South Wales, is the third greatest in the Commonwealth of Australia. In addition to serving the large industrial activities of the district, it is the natural gateway for the wealth of production and large volume of imports and exports of the rich Hunter Valley and the vast agricultural and pastoral areas of the North and North-west.

It is surrounded by a rich coal field in which are operating some 50 coal mines, having an aggregate of fully 8,000,000 tons per annum.

The availability of ample low-sulphur coal of good coking quality led to the establishment at Newcastle of the largest Iron and Steel Works in the Southern Hemisphere.

The rapid expansion of this basic industry led, in turn, to large-scale development of related industries, with the result that to-day Newcastle may be truly regarded as the nerve centre of the industrial life of Australia.

Some 730 acres of shipping space, and 25,000 feet of wharfage are available for commercial use in the Harbour, which has an entrance of 1,200 feet in width, and a main channel 500 feet wide. The depth of water over the bar is 25 ft. 6 ins., and action is being taken to increase this depth to 30 feet.

Special facilities in the nature of Electric and Hydraulic Cranes have been provided to ensure expeditious loading of coal, and Tie-up Berths and Dolphins are available for vessels, free of charge, whilst awaiting loading or undergoing repairs.

**T**HE Port of Newcastle is particularly well equipped as regards facilities for Shipbuilding, Engineering, Docking and Repair work. In 1942 the State Government established a modern Dockyard in Newcastle to cater for the shipbuilding, ship repairing and associated engineering requirements of Australia, New Zealand and adjacent countries of the Pacific. It operates a 15,000-ton capacity Floating Dock, as well as two Patent Slipways of 1,250 tons and 300 tons capacity, and has an 80 ton Floating Crane available for hire at 24 hours' notice. Its single shift employing capacity is to the order of 2,000, the maximum so far registered being 1,500 due to the unavailability of sufficient suitably trained technical staff and skilled works personnel.

The Dockyard caters for the construction of Passenger and Cargo Vessels up to 500 feet in length, together with Dredges, Tugs, etc., complete with propelling machinery, and specialises in expeditious repairs to all types of Steam and Diesel driven Vessels. Since its inception, more than thirty vessels have been placed in commission, including a Twin Screw Corvette, a Twin Screw "River" Class Frigate, and Cargo Vessels up to 3,000 tons cargo-carrying capacity. Some 1,850 vessels with an aggregate tonnage of 6,150,000 have been docked and repaired. Eleven vessels are under construction, including passenger and cargo vessels, ocean-going dredges, tugs, and a rock breaker.

The m.v. "Dongara," under construction, is the first Passenger Vessel to be built in Australia, and the two 305 feet Twin Screw



Mr. D. LYON McLARTY  
M.I.E. (Aust.), M.I.E.S. (Scot.),  
Director, State Dockyard, Newcastle.

Motor Cargo Vessels under construction for the Union Steamship Company of New Zealand, are the first orders to be placed in an Australian shipyard by an Overseas firm.

Newcastle's considerable electric power supply demand is at present satisfactorily met by

a number of Government and privately owned power stations. The assured expansion of the district has resulted in an advanced stage being reached in proposals for the establishment of an additional large electric power station in the immediate vicinity which will be linked up with Sydney power stations in the South, and those of Brisbane and the Clarence River in the North.

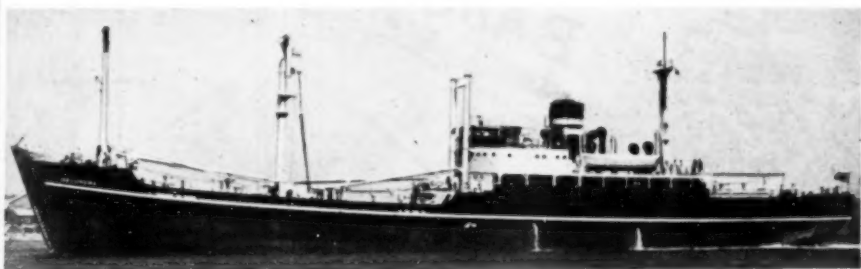
The important aspect of abundant water supply is assured of progressive attention by the Hunter District Water Board, whose main storage reservoir at Chichester has a capacity of 5,000,000,000 gallons. The enterprise of the Board is illustrated by the recent development of the major source of water supply existing in the extensive area of sandbeds in the Tomago district, believed to be not less than 50 square miles. Fifteen pumping stations, each estimated to have an average capacity of 1,000,000 gallons per day for a short period under favourable conditions, have already been constructed. The pumps and pipe lines have been designed to accommodate a maximum delivery rate of 25,000,000 gallons per day.

No other industrial centre in Australia offers such a comprehensive combination of advantages to interests contemplating the establishment of new or additional manufacturing plants, as Newcastle and district.

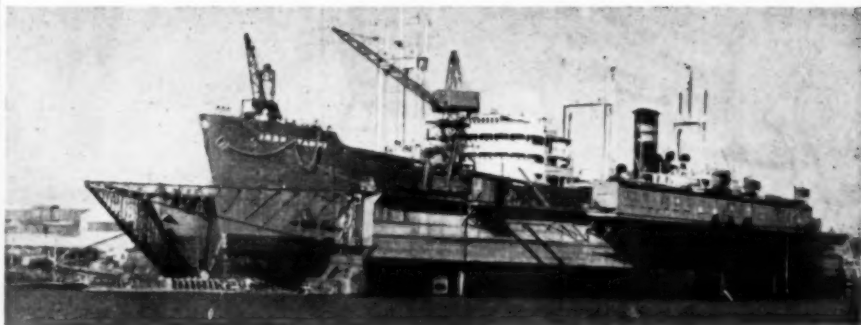


State Dockyard, Newcastle





S.S. "DELUNGRA" undergoing trials.



The B.H.P. "IRON YAMPI" in The State Dockyard Floating Dock at Newcastle.

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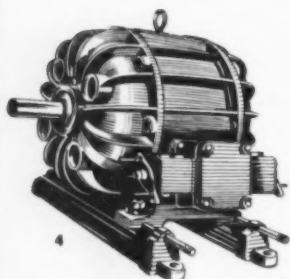
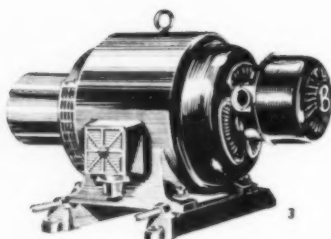
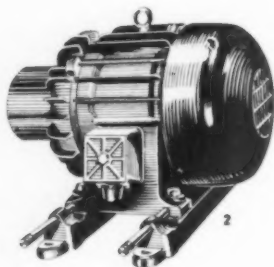
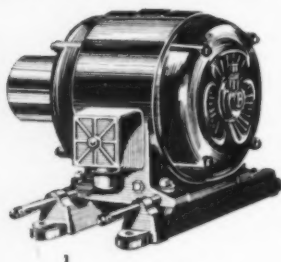
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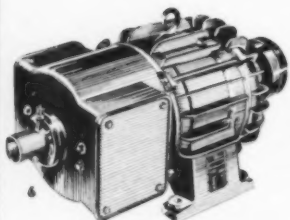
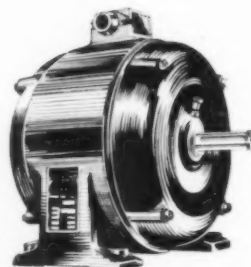
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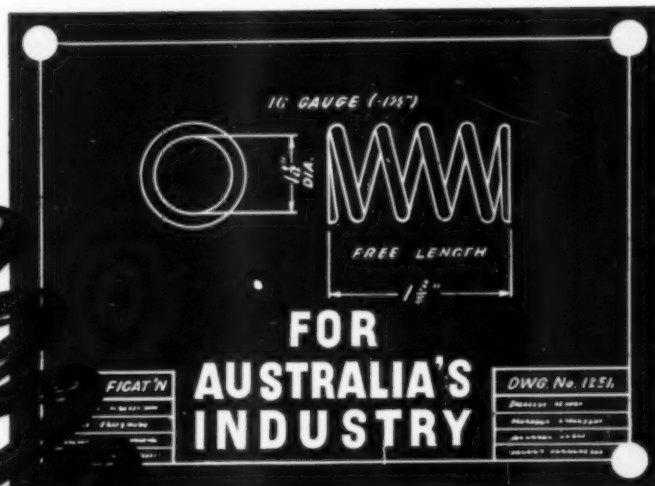


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# THE AUSTRALIAN WOOL MANUFACTURING INDUSTRY



Contributed by the Australian Wool Board.

**I**N addition to being the world's greatest producer of wool, Australia is, per head of population, probably the world's leading wool consumer.

Figures quoted not long ago by the United Nations Food and Agriculture Organisation place this country third among the wool consumers of the world, but a recent analysis made by the Bureau of Agricultural Economics, Australia, indicates that the Commonwealth may, in fact, be the leading consumer on a per capita basis.

The F.A.O. figures referred to give the following per capita consumption on a clean basis in the following leading countries: United Kingdom, 5.27 lb.; Belgium-Luxembourg, 4.76 lb.; Australia, 4.63 lb.; New Zealand, 4.63 lb.

On the other hand, the Bureau of Agricultural Economics' analysis—arrived at presumably on a different basis—gives the following Australian wool consumption per capita, again on a clean basis: 1938-39, 5.94 lb.; 1945-46, 6.26 lb.; 1946-47, 6.51 lb.

**F**ROM humble beginnings in the early days of settlement in New South Wales, the wool textile industry of this country has grown to be one of its most important secondary industries. Established in every State—and particularly in Victoria and New South Wales—the woollen and worsted industry was, even before the war, filling practically the whole of Australia's needs and has in the post-war period expanded considerably.

The new industry, of course, passed through many vicissitudes in the last century, but its record has been marked by steady progress. In 1901, when Federation was established, Australia had 18 mills, employing 1,619 workers. By 1913 the number of mills had increased to 22 and the number of workers to 3,090. Clearly, the mills, as units, were becoming larger.

The 1914-18 war, because of the urgent demands for locally manufactured textiles, gave the industry a marked impetus. During the war period seven mills came into existence and the mills themselves grew in size until the total number of employees in the industry was nearly twice as great as in 1913, while the output became three times as great as that in the pre-war period.

Progress continued during the 'twenties, and by 1930 the number of mills in Australia had increased to 50, 27 of which were in Victoria. In addition, there were in operation 242 hosiery and other knitting mills.

History repeated itself during the last war. War needs placed a heavy demand on the industry and these were met in a gratifying manner. By 1941-42 the total number of mills in operation was 111, and the number of employees 26,362, as compared with 90 mills and 19,608 employees in 1938-39, the last pre-war year.

As the war continued, the demands made on the industry to supply service needs—not only Australian, but Allied requirements—increased, with the result that total production expanded by more than 100 per cent. This was attained by expansion of numbers in the industry, expansion of hours worked and considerable simplification of the goods produced.

Not only were service and civilian needs met. During the war years an export trade was opened up in overseas countries, but since the war ended the difficulty has been to meet local requirements as well as to develop the export trade.

One significant indication of the growth of the Australian wool manufacturing industry is given by the increasing quantities of Australian wool used by local manufacturers. In 1906-07 they bought 66,019 bales. By 1921-22 the total had risen to 138,079 bales; while in 1938-39—the last pre-war year—it had increased further to 378,694 bales. The following are the figures in the post-war period:—1945-46, 407,245 bales; 1946-47, 647,823 bales; 1947-48, 675,177 bales.

It must be remembered, however, that during the war the Commonwealth Government paid a subsidy in respect of wool purchased for consumption within Australia. This subsidy, the purpose of which was to make wool goods cheaper to consumers than they otherwise would have been, ceased on June 30, 1948. The full effects of the cessation have yet to be assessed.



Mr. DOUGLAS T. BOYD,  
Chairman, Australian Wool Board.

The use by Australian manufacturers of a steadily increasing quota of the clip is beneficial to growers and manufacturers alike. So far as the growers are concerned, it provides steady competition at auction sales and thereby exerts an influence on the stabilisation of prices.

The latest figures—made available last December—issued by the Commonwealth Statistician, emphasise the remarkable growth of the industry in the post-war period. The number of mills is 142, the value of output, £29 million, and the value of materials used, £16,070,000. Victoria has the largest number of mills—76—with 52 in New South Wales, three in Queensland, four in South Australia, two in Western Australia, and five in Tasmania.

In 1947-48 woven products turned out were 18,700,000 square yards of woollen cloth and tweed, 16,200,000 square yards of worsted cloth, 3,227,000 square yards of flannel for outer clothing, 1,641,000 square yards of flannel for underwear, 721,000 pairs of blankets, and 67,750 rugs. Before the war Australia produced 8,830,000 square yards of woollen cloth and tweed, 17,986,000 square yards of worsted cloth, 574,000 pairs of blankets, and 107,000 rugs.

The development of the Australian carpet industry represents a highlight in the industry. In a review of the carpet industry last year the Division of Industrial Development, Department of Post-War Reconstruction, stated that the supply of Australian carpet was rapidly increasing in volume, and that indications were that it would not be long before output would be above estimated annual requirements.

Carpet manufacture in Australia began in 1936. The industry now makes two well-known types of carpet with wool pile and jute base—Axminster and Wilton. Pre-war imports from the United Kingdom were 75 per cent. Axminster and 8 per cent. Wilton.

Another post-war feature of the wool manufacturing industry is the increasing number of English textile firms which are establishing themselves in Australia.



# Australia's SUGAR PRODUCTION

By Mr. E. T. S. Pearce, General Secretary, Australian Sugar Producers' Association Limited.

**A**USTRALIA now takes a place amongst the major cane sugar countries of the world; in point of efficiency it stands second to none. The growing of cane constitutes the largest agricultural industry in Queensland, and the cane growing and milling sides of the industry provide the largest single employment agency in that State. Though on a much smaller scale, sugar production in New South Wales is by no means unimportant in that State.

**W**HEN an Australian Raw Cane Sugar Industry was first brought into being in the 'sixties of last century, it was naturally moulded on the pattern of the industry as carried on in other countries. In every cane sugar country of the world, without exception, coloured labour was regarded as being indispensable, and it may well be doubted whether anyone in Australia would have been rash enough to embark on sugar production had not the prospect of obtaining cheap coloured labour been envisaged. Not only was cheap labour demanded on the grounds of economic necessity, but there was the long-standing and implicitly accepted tradition that white men were unable to sustain heavy physical labour without serious impairment of health in the tropical and extra-tropical regions of abundant heat and rainfall required for the successful growth of sugar cane.

That practically the whole of the necessary cheap coloured labour was found in "Kanakas" specially recruited for the purpose from the comparatively near islands of various Pacific groups, and that the Kanakas played a most significant part during the first thirty or more years in building up an Australian sugar industry of substantial magnitude need be mentioned here only as historical facts.

But, if the planters themselves were convinced that an ample supply of such labour was vital to the success of their industry, the community at large looked with marked disfavour on the presence in the sugar districts of several thousands of people of alien race

for whom there was no place within the social fabric of the community. Long before Federation, opposition to the Kanaka traffic had so far crystallised that it had become apparent that, if Federation of the Australian Colonies were to be achieved, the Kanaka would have to go.

Actually within a year of the first Commonwealth Parliament being brought into existence, "The Pacific Island Labourers Act of 1901" was placed on the Statute Book. This set a deadline after which no further introduction of Kanakas would be permitted, and provided also for the progressive repatriation of practically the whole of the Kanakas then in the country.

The industry thus became committed to a huge experiment, unprecedented in any part of the cane sugar world—the production of sugar in the tropics solely with white labour.

Though not without misgivings in some quarters as to what would be the outcome of the experiment, the industry faced up squarely to carrying on under the new conditions. It was hoped that with white labour it might be able to attain such higher standards of technical efficiency as would be an offset to the higher costs of white labour.

Various trends were already operating within the industry which were helpful, not only in the transitional labour period, but also in the drive for efficiency. The large plantations employing a few white overseers and many Kanakas, which had been a feature of the early days of the industry, had mostly been divided into a large number of farms, worked by their farmer-owners and providing opportunities for the employment of white labour. In 1900, a Sugar Experiment Station was established which, in later years, became a very material factor in helping to guide the industry on scientific lines. In the early days a very large number of very small

and—judged by modern standards—very crude sugar mills had been brought into existence, but the trend to fewer but more efficient mills was already well marked before the close of the century. For instance, in Queensland alone there were 166 mills in 1885 which, between them, manufactured 59,000 tons of sugar. By 1901 the number of mills had been reduced to 52, but the output of sugar had been increased to 120,000 tons. That trend has since continued and will be referred to later.

Although the transitional period presented many problems and later, World War I. gave a serious setback to the industry, there was over the period 1901 to 1920 a gradual but positive increase in production and in productive efficiency. The experiences of the war had, however, pointed rather dramatically to the urgent necessity of still further increasing production to the point of at least being able to furnish the whole of the sugar required for Australian consumption. A favourable price was given to the industry for a few years for the express purpose of encouraging an expansion of production. The response was immediate; a great many newcomers were attracted into the industry, and by 1923 Australia for the first time attained self-sufficiency in sugar. In every subsequent year the industry has had a surplus for export.

The years from 1920 onward have witnessed an intensification of the drive for efficiency. Science has been increasingly invoked in promoting better husbandry, the control of the diseases and pests which afflict sugar cane, the breeding of new varieties of cane of higher productivity and higher resistance to disease, and in many other ways.

On the manufacturing side, the number of mills now stands at 35, but practically the whole of these are large, highly modern and



Mr. E. T. S. PEARCE,  
General Secretary, Australian Sugar  
Producers' Association.



Motor transport of cane. This practice has increased rapidly in recent years.  
(Photo, Department Agriculture & Stock, Brisbane)



extremely efficient units operating under close scientific control. Although production was seriously affected during World War II, the output in each of the past two seasons has been upwards of 900,000 tons of sugar, and has somewhat exceeded the maximum attained in any pre-war year.

The significance of the sugar industry, however, goes beyond its function as a highly efficient wealth producer in the economy of the State; it is bound up with the Commonwealth as a whole. The sugar industry has been responsible for the effective settlement of some hundreds of miles of the most vulnerable portion of the Queensland tropical coast where no other land industries have succeeded in establishing themselves. Eighty-five per cent. of the Australian sugar out-turn is produced in this tract, which contains 22 of the 35 mills. Each of those mills treats the cane grown on two to three hundred farms in the surrounding district, and the farmers with their families create substantial permanent communities which are swelled by employed farm and mill workers, most of whom also make their homes in the district. In addition, quite considerable towns and townships have been brought into being to serve the needs of the local communities. Apart from the basic needs supplied by the butcher, the baker, etc., most of these town-

tered, and if possible, extended, and their communications be still further improved. Up to the present, sugar has been the only product which has proved capable of developing

ment participated in negotiations with the United Kingdom Government on the subject of export sugar quotas, and, arising out of these discussions, Australia was able to conclude favourable terms covering future exports.

Up till 1953, the existing contract with the British Ministry of Food remains in force; under this, the U.K. will purchase the whole of the Australian exportable surplus.

Under the terms of the new agreement, the U.K. Government has undertaken to find an outlet annually, from 1953 to 1957, for up to 600,000 tons of Australian sugar. Of this annual quantity, 300,000 tons will be purchased by the U.K. at a guaranteed price to be negotiated annually. The remaining 300,000 tons will find an outlet in the preferential markets of the U.K. and Canada. Provision has also been made for the annual extension of the agreement by mutual consent; this should enable a continuing market to be arranged for these quantities of sugar for eight years ahead.

Under the International Sugar Agreement of 1937, Australia was allotted an export quota of 400,000 tons annually. The new agreement with the U.K. therefore provides an annual market for an additional 200,000 tons each year, the realisation of which will permit a considerable expansion of the existing level of production within the industry. This expansion, with its consequential further



Horses carting cane to the railway. Horses have now been largely replaced by motor vehicles and tractors.

(Photo, Department Agriculture & Stock, Brisbane)



A stubble shaver drawn by a crawler-type tractor. All cultivation activities are now highly mechanised.

(Photo, Department Agriculture & Stock, Brisbane)

ships provide all the amenities available in much larger centres, and undoubtedly make country life attractive. The old superstition that white men could not labour in the tropics has long since dissipated. The Queensland tropics have, indeed, been conclusively proved to be quite as healthy as any other portion of the Commonwealth.

The considerable, though scattered sugar communities have, of course, called for effective intercommunications, and excellent roads have been brought into existence, while railways have been extended and port facilities have been enlarged to deal with the expanded sugar traffic and the general freightage arising from the various sugar centres.

It is recent history that these communications, primarily built to serve the sugar industry, proved a vital factor in the transportation of men and materials to strategic marshalling centres in North Queensland, and it cannot be doubted that these concentrations of men and materials, so made possible at critical times, made a most material contribution to the ultimate success of the Allied forces in the South Pacific areas. But while present success has been achieved, it does not follow that the threat of aggression has been removed for all times, and it is essential that the settlement of the northern areas be fos-

the tropical coast on any considerable scale. Apart from sugar, it is apparent that these lands, outside the ports which serve as door-



An 8ft. rotary hoe preparing a recently harvested area for fallowing or replanting.

ways to vast hinterlands, would still have remained sparsely and ineffectively occupied. Just recently, the Commonwealth Govern-

development of Australia's north-eastern coastline, will be of great value to Australia, both economically and strategically.



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## ABSORBING NEW AUSTRALIANS IN INDUSTRY



Article prepared especially for the 1950 Annual Number of "the Australasian Manufacturer" by the Commonwealth Department of Information, Canberra.

ON October 14, 1949, over 31,000 New Australians were spread through Government undertakings and private employment of a vital nature. At the end of 1949 there was 50,000 so employed. It will not be many years before these New Australians will have completed their residential qualifications and, with their children, will move among us as proud and loyal citizens of their new homeland—a developed and secure Australia.

WHEN Australia emerged from the terrible and deadly conflict in which she had been engaged for the six years from 1939, she found herself a country that had given much, but a country rich in productivity and richer still in potential. Industry stood waiting for the hands that would set the machines spinning into full production; vast stretches of rich soil lay waiting the tiller's touch to yield up their wealth of food to Australia and the shattered peoples of Europe.

Australia faced tremendous problems in all types of production. For six years the country had been geared to war and those things which, in peace time, must rank as cogent necessities, had been subordinated to the war effort as the nation pressed on in its struggle for survival.

When the war clouds lifted, these problems became desperately real. Of these, probably the most immediately urgent was housing. For six years there had been no private building and only the most vital repair work had been effected. The lag in homes to shelter our people had never been greater. And the labour to build in the quantities and with the speed necessary was not available.

There were other problems also, problems created by a lack of adequate manpower. Manpower was required in food production, and processing; iron and steel production; road and rail construction and maintenance; domestic service for hospitals, guest houses and hotels.

But there was a graver problem yet that stood stark before our eyes. If we could not develop our country, if we could not occupy our vast areas; if we could not win the food and wealth from our soil, could we withstand a later challenge from those who would?

There was only one answer to all these difficulties—a rapid and great increase in population. And the only hope for the necessary great increase in population lay in immigration on a scale and with a rapidity never previously envisaged in Australia's history.

Australia looked around. There were two great sources of potential migrants.

Great numbers of our own British stock looked across the seas from England to this land of sunshine and plenty. We beckoned to them to come. And they came. We gave them free and assisted passages. We sent our officers to

tell them of this land, and the Australian way of life. We prepared literature to help them know what they were coming to, and they came in their thousands. The Australian States swung into the task of welcoming them and establishing them on arrival. To-day more than 100,000 British migrants have come to these shores since the war's end.

Another great source of manpower welled in the displaced persons' camps of Europe that sheltered those lonely, unfortunate people that had been swept from their homes and countries by the consuming flood of war.

We have tapped that source not recklessly, not indiscriminately, but with utmost care and selectivity. We have drawn off and are still drawing off, the best of the eager migrants offering. Australian selection teams have screened and medically examined, accepted and rejected.

As a result, to-day, Australia has welcomed more than 55,000 New Australians to her shores. They are healthy, democratically-minded peoples. Many of them are from Poland who fought valourously with our own soldiers in thrusting back the forces of evil

that threatened to engulf our very existence. To-day some 400 of these former Poles and other New Australians who served in war under British command, have become fully naturalised Australian citizens.

Let us see how they are fitting in to our industrial economy. On October 14, 1949, there were 31,472 New Australian men and women employed throughout Australia. They were spread out over vital fields of employment as these figures show:—

New Australians directly concerned with home building	4,219
New Australians indirectly concerned with home building:—	
Rail construction, maintenance and operation	4,152
Road construction and maintenance	847
Water storage and reticulation	2,177
Electricity (Hydro and Coal Fired)	1,147
Other Public utilities	1,653

New Australians generally concerned with home establishment 14,195



Antons Karlis (left) and Zlotic Barirdje are two of the many migrant mechanics working in the Commonwealth Government's big garage at Kingston, Canberra. Both men are expert mechanics, and can handle the most difficult jobs.



So far, many new Australians have gone to South Australia, many of them to work in and around Adelaide. Mrs. Hurko, from the Ukraine, who is employed by General Motors-Holdens Ltd., Adelaide, as a machinist.



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New Australians in Iron and Steel Production ..	543
In Clothing and Textile Manufacturing ..	767
In Food Processing ..	404
In Mining and Quarrying ..	286
New Australians in Domestic Service:—	
On farms and stations ..	527
In Defence Establishments ..	3,812
In private homes ..	1,294
In Hotels and Guest Houses ..	1,530

Those are not all the figures of the allocation of New Australian labour, but they are sufficient to show that our new settlers are being used widely and wisely in employment to alleviate Australia's grave labour shortage. The figures of October 14 show that 55 per cent. of males employed were being used to help with the housing programme, while they themselves were being housed in converted army camps and hostels, and thereby not causing any demand on housing coming available.

Of the female New Australians, 81 per cent. are employed as domestics in hospitals, hostels, hotels, private homes, defence establishments and guest houses.

The employment of New Australians is governed by two fundamental principles. The first is that they be employed only where Australian labour is insufficient. The second is that they be given equal working conditions and rates of pay as Australians.

It has been very pleasing to know that the Department of Immigration is continually receiving report after report from em-

ployers, large and small, throughout the Commonwealth, indicating that the New Australians are making fine contributions towards production while they are rapidly falling into the Australian way of life. As one Regional Director of Employment puts it:—

"Reports from the majority of district officers indicate that the New Australians are no longer treated as strangers and refugees.

They are now accepted as an integral section of the community, playing their allotted part in the development of Australia. From all quarters favourable comments are heard not only with respect to their work, but also to their personal courtesy and general demeanour."

There must be few Australian citizens who have not had some experience of the practical benefits of the New Australians' contribution to our economy, whether it be expressed in the availability of building materials and necessary domestic equipment, the open wards of hospitals, accommodation in hotels and guest houses that had to shut their rooms because of staffing difficulties, or whether it be in the simpler things such as the availability of refined sugar, or canned fruits and vegetables, and of dress materials.

In fact it is true to say that when we find something coming back on to shelves of our favourite store—something that we had missed for some time—we can be sure that somewhere along the production line New Australians played a part.

Already many of the New Australians from Europe have faithfully completed their employment contracts with the Government, and are free to choose their own jobs. Each month others will follow. Many will stay on with their present employment. Those who take other work will still be contributing to our economy.

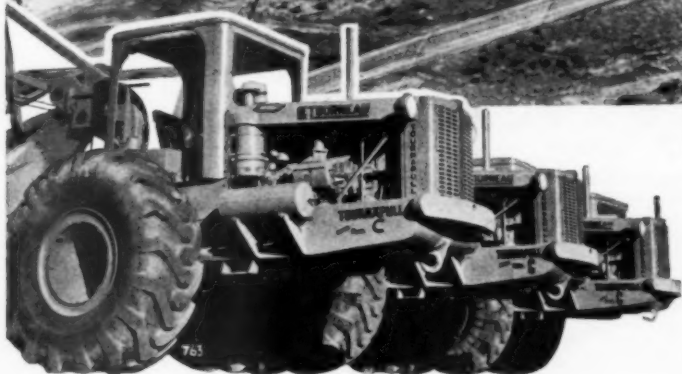


Balts help build Australian houses. At the Hoffman Brick and Pottery Works, at Brunswick, Victoria, one of the biggest of its kind in Australia, more than fifty Baltic migrants are engaged in making bricks and various types of pottery necessary for home building.

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Modern earthmoving equipment on the Glenbawn Dam site. Photo: Courtesy PIX.



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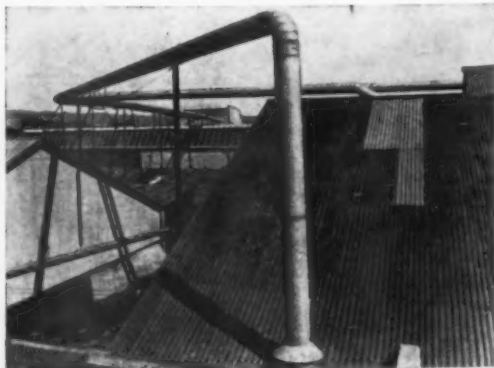
*R. H. Halliday*

PNEUMATIC CONVEYANCE SYSTEM ENGINEER

## FANS For Every Industrial Purpose!



Wool being delivered to the packing floor after having been picked up from four points as shown in the roof picture.



Lifting Wool 32 ft. and conveying it 500 ft.

**Ventilating Mill Exhaust  
Duco Booth  
Dehydrator  
Pneumatic Conveyance**

**R. H. HALLIDAY**

Cnr. BOWDEN AND ANDREW STREETS  
ADELAIDE, SOUTH AUSTRALIA

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## PNEUMATIC CONVEYANCE SYSTEMS

### ENLARGED PREMISES OF R. H. HALLIDAY, OF ADELAIDE

IT is quite uneconomic to conduct many industrial processes nowadays without pneumatic conveyance systems such as can be recommended and installed by R. H. Halliday, the well-known engineer, of Andrew Street, Adelaide. One field of work in which this particularly applies is that of timber or joinery mills, while wool scouring factories provide another noteworthy example.

**D**URING the past year a programme of major additions to Mr. Halliday's premises was completed, yielding total accommodation of 8,000 square feet under the one roof. Two large new bays give extra space which had long been needed in this thriving undertaking. A useful facility is that a four-ton overhead crane can move anywhere in an area of 1,800 square feet in the new part of the workshop.

When the structural additions were completed a noteworthy job in hand was a cyclone separator for a large South Australian metallurgical plant. This was a larger piece of equipment than could have been handled by the firm previously.

Mr. Halliday's activities embrace production of dehydrator fans, duco booth fans, mill exhaust and ventilation installations. Industrial fans are despatched to all States of the Commonwealth and to New Zealand, a gratify-

ing aspect in recent years being the number of fans sent to Western Australia.

The firm also holds a sub-agency for Wadkin woodworking machinery from England, covering mostly joiners and cabinetmakers' equipment.

The building additions happily coincided with the 30th anniversary of commencement of business by Mr. Halliday, and to mark the dual event Mr. Halliday entertained 70 business associates, customers and friends at his premises

on December 2, 1949. The Hon. F. T. Perry, M.L.C., past president of the Metal Industries Association, on behalf of those present, congratulated Mr. Halliday on his record of steady progress and enterprise.



Representative gathering at luncheon which marked completion of building alterations and thirtieth anniversary of R. H. Halliday, Adelaide.





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PYROMETER TUBES, SALT BATHS AND LADLES,  
HARDENING POTS, FURNACE TUBES AND  
DOORS, SOOT BLOWERS, COMBUSTION  
CHAMBERS, ETC.

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INCLUDING LEATHER WEARING APPAREL FOR  
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## METAL COATINGS PTY. LTD.

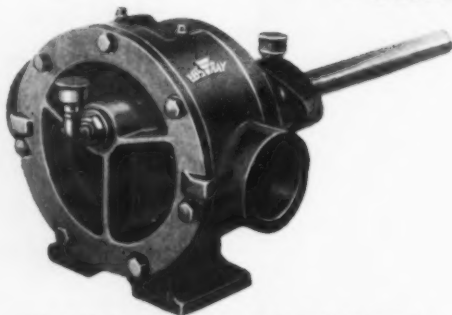
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# EBS-RAY

## — STEADY FLOW —

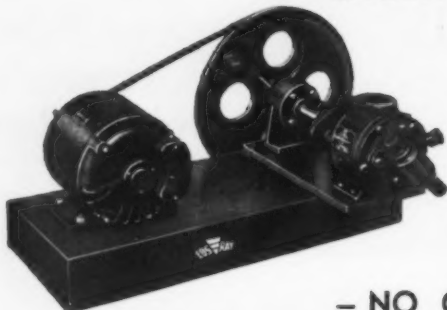


EBS-RAY Standard Rotary Positive Displacement Pump with horizontal ports.

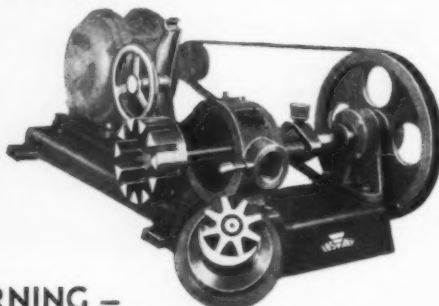


EBS-RAY Standard Rotary Positive Displacement Pump with 90° Ports and By-Pass Valve.

## — EFFECTIVE SUCTION —

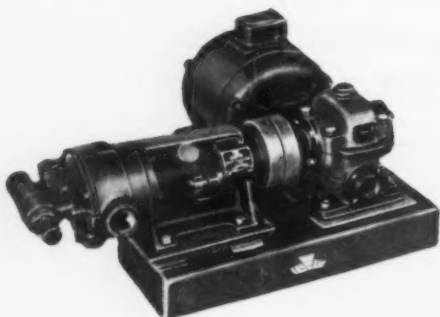


EBS-RAY STANDARD POSITIVE DISPLACEMENT ROTARY PUMPS:—  
Capacities from **2 to 250 G.P.M.**  
Pressures to **100 lbs. per sq. in.**  
For handling clean fluids of any viscosity.  
Also manufactured in corrosive-resistant alloys.



EBS-RAY "HYGIENIC" POSITIVE DISPLACEMENT ROTARY PUMPS:—  
Capacities from **5 to 85 G.P.M.**  
Pressures to **25 lbs. per sq. in.**  
Ideal for Distillery and Food Industries—designed specifically for quick and easy cleaning.

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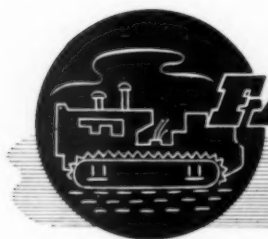


EBS-RAY HEAVY DUTY POSITIVE DISPLACEMENT PUMPS:—  
Capacities from **5 to 250 G.P.M.**  
Pressures to **400 LBS. PER SQ. IN.**  
For handling clean fluids of any viscosity where operating heads are greater than normally encountered.



EBS-RAY HIGH VACUUM PUMPS (Aust. and World Patents):—  
Capacities of **1, 5 and 15 cubic feet per minute.**  
Vacuum of **.005 M.M. of mercury or better.**  
Ideal for Distillation, Impregnation, Exhausting, Dehydration and Laboratory Research.

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Sales for Victoria and Tasmania: KL DISTRIBUTORS PTY. LTD., 460 Bourke Street, Melbourne



## FARM IMPLEMENTS

By B. R. Sharp, Sales Director, H. V. McKay Massey Harris Pty. Ltd.

**S**TRENUOUS efforts are being made within the British Commonwealth of Nations to increase food production. It is essential that these efforts should succeed if the Nation is to play its part in assisting to feed, more adequately, the millions in the world to-day who exist without knowing what it is to be properly fed. Furthermore, the opportunities offering to soft currency countries should be accepted to the fullest possible extent. The food situation in the United Kingdom itself was serious enough even before the dollar crisis accentuated it. Following devaluation of its currency, Great Britain—unable to purchase food so freely in the Americas—must look to her partners in the Commonwealth of Nations to make up the shortage.

**A**USTRALIA is in fairly good shape to make its full contribution to this effort. Since 1944, seasons have been bountiful, and there is every indication that the wheat crop of 1949-50 will be well above the average. Farmers have overtaken the production lag of the war years, during which there was little encouragement for the growing of more wheat. Large areas are being opened up to increase cattle production. Sorghum and peanuts are being grown more extensively to provide stock food and edible oils. New country in each State is being cut up and allocated to returned servicemen for use as wheat-lands and for mixed farming.

To enable Australian farmers to maintain production standards achieved in the recent past, and to increase them, a great deal of new farm plant is needed. Labour saving machines are vitally necessary to help overcome rapidly increasing costs and the dearth of rural manpower to permit of profitable production. Many farmers are weary of being compelled to make do with machines which are less efficient than modern models in short supply—or, worse still, worn beyond the stage of giving real satisfaction to the users of them.

Our farmers are worthy of the highest commendation for the manner in which they have managed to cultivate, sow, and harvest better than average crops. They have kept old machines at work by the use of replacement parts, which, fortunately, are available in increasing quantities, and have needed to be because the call for them in late years has established record upon record.

Agricultural machinery manufacturers share, in full, the disappointment of users that ample supplies of new machines are not freely available. This position is due, almost solely, to the shortage of manpower. The outstanding problem facing manufacturers is their small production compared with total demand. While this situation obtains, replacement parts must have priority.

A survey made recently by the Commonwealth Department of Agriculture indicated that the present annual rate of production of the major lines of agricultural machines and implements approximates the rate of wear out. But acceptance of this conclusion may lead to a false sense of security, for it is well known that there are thousands of machines and implements that are known by their owners to be inefficient, because they are either too much worn or are obsolete. This conclusion is confirmed by the orders which farmers have placed and continue to place with manufacturers for probable delivery two or three seasons hence.

This is a parlous state of affairs—bad for the internal economy of the country, and bad for our present and future overseas trading. In respect of the latter, our implement makers are able to accept only a tiny proportion of the orders received; just enough to maintain business interest in places where trade has been long established—and none at all from the new customers who, along with the old, are clamouring for the high-grade, efficient farm machinery developed and made in this country.

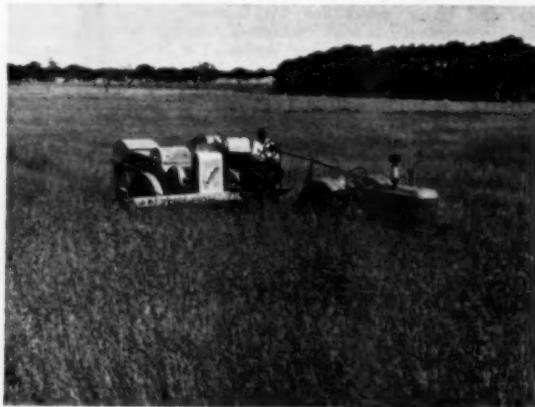


Mr. B. R. SHARP  
Sales Director of  
H. V. McKay-Massey Harris Pty. Ltd.

Thus is being lost an opportunity of establishing for the Industry a trade volume which would consolidate its position and also provide for the workers therein the best assurance of continuity of profitable employment during times of drought or depression in Australia—and which would also mean lower



10ft. Sunshine No. 4 Power Drive Header harvesting 36 bushels of Quadrat wheat to the acre on a farm in Victoria. A completely one-man outfit. Tractor driver operates hydraulic raising and lowering gear. Machine equipped with 30-bushel grain box.



Harvesting 42 bushels of Quadrat wheat per acre with a 10ft. Sunshine No. 6. Power-drive harvester, coupled to a Sunshine Massey Harris tractor. Note the one-man control of header and tractor.



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. . . first in economy. That's why so many Architects,  
Builders and Plumbers recommend "SYPHONIA" Fittings  
for hot water systems.



"SYPHONIA" Hot Water Fittings are manufactured by us  
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Fittings extends to everything that bears the "SYPHONIA"  
trade mark. The sanitary protection and long serviceability  
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satisfy and sell the most exacting client.



## MASTER PLUMBERS MANUFACTURING CO. PTY. LTD.

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machine and implement costs to the Australian farmers, because of the spread of fixed overhead charges.

The irony of the situation is that the plant capacity of the Industry is upwards of double the output achieved in recent years and of that which can be planned while the current shortage of manpower exists.

While the disabilities encountered have been considerable, farmers—with that enterprise for which they are renowned—have operated successfully. In many cases the versatile Seed Drills and Harvesting Machines have sown and harvested a remarkable range of grains and seeds. The emphasis now placed on a range of crops wider than wheat, oats, and barley means that the farmers' machinery generally is working more days in the year. The Queensland farmer harvests his wheat in November and his sorghum in April with the same equipment; farmers in the Murrumbidgee Irrigation area of New South Wales harvest their wheat in December and their rice in May; others throughout Australia take off peas and grass seed as well as the usual cereal crops.

There has been a huge increase in the number of tractors at work in Australia; the tractor population has increased from 41,943 units in 1939 to 86,743 in 1949, and while, recently, the largest quantities of new tractors have come from the United Kingdom, a considerable number also came from the U.S.A. and some thousands were made in Australia. Present-day manufacture of tractors in Australia runs to at least five makes compared with two in pre-war days. Modern tractors can travel much faster than a good horse team, and faster than most older tractors. This has necessitated the re-design or modification of farm machines to enable them to stand up to the more rigorous usage to which they are subjected and to maintain per-

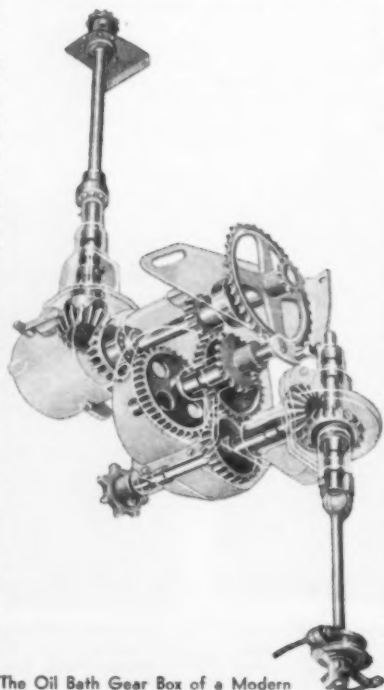
formance and durability. There is now nearly a universal demand for power-take-off driven headers, harvesters, reapers and binders, and mowers, and this has meant supply of a variety running into hundreds of power-take-

off couplings to suit the many makes of tractors in use. Development of these couplings has been a very considerable task for implement manufacturers, in the successful outcome of which they have reason for satisfaction. The power driven machines can cope with varying conditions better and usually have a capacity for more work than the older type of ground driven machines.

Ever since the commercial production of the Harvester by the late Hugh Victor McKay, Australian farm machinery has been planned to give maximum efficiency—which may be construed as meaning least overall cost to the farmer to do his work. Higher ground speed has already been mentioned; in addition, there has been a continuous increase in the average size of machines produced. The provision of both together gives a very great increase in the possible rate of doing work, with consequential reduction in man-hours of farm labour. The satisfactory solution of the problem has only been possible by planning consistently for the use of highest grades of raw materials with thorough control over all the manufacturing processes and acceptance of close dimensional tolerances. As an example, the picture on this page, "The Oil-Bath Gear Box of a Modern Header."

The whole of the parts of this assembly are made in an Australian Implement Factory, just as accurately, of similar material with heat treatment, as are the gear boxes of high-grade imported motor vehicles.

There is no doubt that the consistent efforts of manufacturers to improve quality and efficiency is resulting in more total useful work during the life of wearing parts with lower overall cost per unit of work done, and that the increased efficiency of modern machinery far more than repays the necessary added capital cost.



The Oil Bath Gear Box of a Modern Header.



THE AUSTRALASIAN



MANUFACTURER

# STRUCTURAL STEELWORK AND ALL CLASSES OF M.S. PLATE FABRICATION

James Mullan Pty. Ltd. are contractors to many public utilities and industrial organisations throughout Australia. Their large Newcastle plant, specialising in structural steel work and all classes of M.S. plate fabrication, is fully equipped to design and construct all classes of fabrications.

(Bottom left): Illustration shows Tydarch "Steelarch" Spans constructed under licence by James Mullan Pty. Ltd. for Newbold General Refractories Ltd.



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"STEELARCH"

foremost in

**DESIGN ★ ADAPTABILITY ★ ECONOMY**  
**SIMPLICITY OF ERECTION ★ SERVICE**

The 160 ft. span Tydarch construction illustrated above was fabricated at our works and transported to the site on trucks for assembly by simple field connections. It was erected without use of cranes. Trusses are mounted on 20 ft. stanchions.

The Tydarch method of construction reduces horizontal wind-loading by 75%; spans can be constructed up to 200 ft.; it facilitates the use of hoists and gantries; it's cheaper to erect and in initial outlay.

James Mullan are Tydarch distributors and inquiries concerning this new type of "Steelarch" construction may be directed to James Mullan Pty. Ltd., Newcastle, or Box 3441, G.P.O., Sydney.

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**HIPSWELL MODEL 0332**  
OVERALL DIMENSIONS — Height 20",  
Length 15", Width 11".  
NET WEIGHT—approx. 38 lbs. (including  
motor).

## A HIGH-SPEED SENSITIVE DRILLING MACHINE with FINGER-TIP CONTROL

### FEATURES

- Three Speeds — 9,000, 7,500, 6,200 R.P.M.
- Quiet Operation.
- Capacity—0 to 3/32".
- Rigid Fixed Head.
- Inbuilt Hand Rest.
- Single or Three Phase 1/2 H.P. Elec. Motor, 2,850 R.P.M.
- Positive Drilling Depth Stop.
- Drill Head adjustable laterally and for height.
- Feed Control by sensitive finger lever or knurled knob.

With this compact, bench-mounted, motorised drilling unit, the work is raised to the drill on a 3 1/2" diameter table which is controlled by a sensitive finger lever and adjustable depth stop.



## Semi-automatic TAPPING MACHINE with the new BALL-RACE SPINDLE and BALL-BEARING PULLEYS

Compact, entirely self-contained, this bench-mounting Tapping Machine features the new ball-bearing spindle and ball-bearing pulleys. These bearings maintain a longer life, require less frequent lubrication and reduce power loss to a minimum.

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Sole Distributors in Victoria, S.A. and W.A.: McPherson's Ltd.

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# HIPSLEYS LIMITED

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**HIPSWELL**  
Model 1438/3 BM



# DEVELOPMENT IN HONING EQUIPMENT AND PRODUCTION TAPPING MACHINES



Improvements in production by new methods and better machines are helping to solve many of the industrial problems and offer industry the security which it needs to progress. Hipsleys Limited have again this year made further contributions to industry in Australia with new Honing Equipment and improvements to the well-known Hipswell Tapping Machine and Hipswell Sensitive Drilling Machine, illustrated on the opposite page.

The necessity for fitting to close tolerance is increasing from year to year, and much of this precision work is more economically accomplished by honing than by any other process.

Honing is a process requiring inexpensive equipment which can produce accuracy to limits of .0001" with a very high grade of finish, very quickly and without more than average skill on the part of the operator.

Hipsleys Limited have designed and manufactured many different hones for special jobs, from "Tommy Gun" barrels to 6' long steel tube, and their wide experience is reflected in the quality of their Standard Hone Equipment—Hipswell Cylinder Hones, which have a range from 2 1/16" to 6 5/8", and Sesqui Hones and Honing Machine, which cover six different types of hones, each designed for different classes of work. The smallest hone starts at 1/4" and the largest hone extends to 2.40".

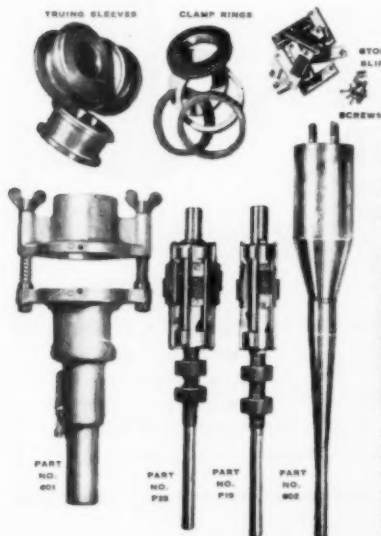
## WET HONING

The popularity and success of small bore honing has led to the development of the Wet Honing process, which facilitates faster cutting speeds and higher standards of finish. The illustration on this page shows the generously proportioned tank which has a built-in weir to settle the honing fluid and two drain plugs to assist in easy cleaning. The honing fluid is directed on to the hone through a flexible pipe fed by a small centrifugal pump located in the tank and driven through a flexible drive by a small pulley running on the inside periphery of the large pulley of the Sesqui Honing Machine. The flow of the fluid is controlled by a cock. The action of the honing fluid is to carry away generated heat and to wash away the metallic particles and the grit dislodged from the honing stones. The dispersion of the heat controls the scoring or pick-up of the surface and the wash produces a surface with a particularly high standard of finish.

## PILOTED HONE

The control of work to be honed normally takes the form of fastening the job and introducing the rotating hone to the work, or holding the work by hand and stroking it to and fro over the rotating hone. The latter method is usually employed with Sesqui Honing Equipment and ample control is normally retained to produce work free from taper and "bell mouth."

There are occasions however when, due to the design of the component or the condition of a job to be reclaimed, it is desirable to guide the work while passing it to and fro over the rotating hone. The need for this guiding of the work often occurs when honing objects with relatively large bores and narrow width.



The Sesqui Piloted Hone has been designed for this function and has given extremely accurate results and due to the multi-stone design very fast honing times. Full control is maintained over taper and "bell mouth"—the two most common errors—and the operator very quickly gains confidence and versatility with the equipment.

The Sesqui Piloted Hone has been designed for use with the Standard Sesqui Honing Machine, using the wet honing attachment illustrated on this page. The method of expanding the multi-stone hone is by the standard patented Sesqui Micrometer Head. The range of the hones is from 1.40" to 2.40"; Hone Body Part No. P19 expanding up to 1.90" and Hone Body Part No. P25 covering the balance of the range.

The work is placed in the Work Holder, Part No. 601, and centralised by sliding the holder and the work onto the Centralising Mandrel, Part No. 602, where the job is clamped up in the Work Holder. To cover the range of from 1.40" to 2.40", a series of different sized clamp rings are supplied which are held inside the Work Holder by ball and spring catches.

Two adjustable, knurled stops on the threaded portion of the hone body come up against the trigger on the work holder, thereby limiting the length of the stroke of the work over the hone stones.

In short, the function of this equipment is to rigidly hold the work centrally over a rotating hone and at the same time control the length of the pass of the job over the hone stone.

## AUTOMOTIVE CONNECTING RODS

A special application of the Sesqui Piloted Hone is the reclaiming of the big end of Automotive Connecting Rods, particularly those used on Ford V8 cars and trucks.

Thin-wall connecting rod bearings are finished to a very high standard of accuracy and to-day are available for practically all makes of cars. All these bearings are manufactured with a certain amount of "free spread" and an allowance is made for the "crush" of the bearing, so that when the connecting rod is tightened down with a tension wrench the back of the bearing shell is forced against the full area of the housing and must therefore take on the shape of housing. It is most important, therefore, that the connecting rod big end housing be a true circle with no taper and of the correct diameter. If this is not so, the bearing shells, by conforming to the housing, will reproduce the errors. If the housing is not to size the correct amount of "crush" will not be applied to the bearing shells, which will either be distorted due to excessive "crush" or be loose and fail to make full contact with the housing. Both of these conditions will result in bearing failures.

It has been found in practice that a large proportion of connecting rods will go out of round to some degree after use and it is therefore impossible to endeavour to fit precision

factory finished bearing shells and obtain a first class job. All connecting rods big end bearing housings must be checked for error and out of round and errors rectified before fitting slip in bearings.

In the case of Ford V8 connecting rods, the condition of the big end is of even greater importance as the connecting rod moves on the outside of the bearing shell and a true connecting rod with a high finish is essential.

The Sesqui Piloted Hone Honing Equipment will true connecting rods quickly and to exact limits and therefore makes the use of precision factory finished bearing shells a highly desirable practice.





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There are many problems in your industry that cannot be settled by your Factory Staff—problems that call for the service of specialists.

Within our organisation, expert engineers are always on the job, planning and producing. These skilled engineers of ours from their accumulated practical experience in planning drives that are models of efficiency, silence and low-cost, can solve your transmission problems.

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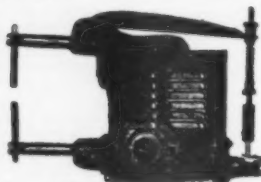
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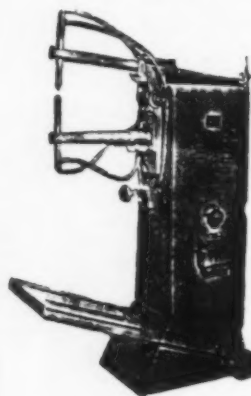
## DON ELECTRICAL COY. PTY. LTD.

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"Don" Bench Welder.

### SPOT WELDERS With Special Features



"Don" Standard Spot Welder.

- Ample Power
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- Easy Manipulation
- Wide Heat Control
- Water Cooled Points.





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Specialists in oils for metal cutting and metal working . . . for heat treatment . . . for machine lubrication and textile processing—Paykel Bros. (Aust.) Pty. Ltd. freely offer their personalised technical assistance—based on Houghton research—towards raising standards of accuracy, of finish, of rate of output.

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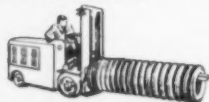


# LIFT IT - CARRY IT - STACK IT

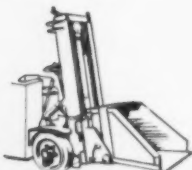
## WITH CONVEYANCER FORK LIFT TRUCKS



SWIVELLING CARRIAGE



SINGLE FORK

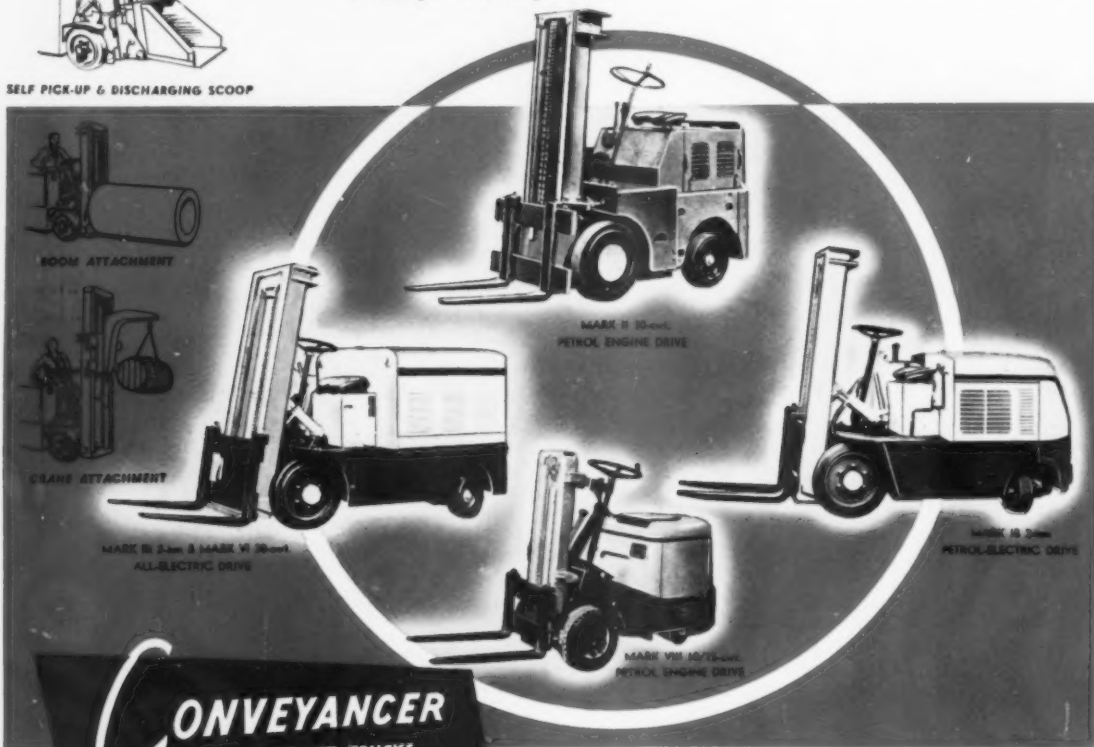


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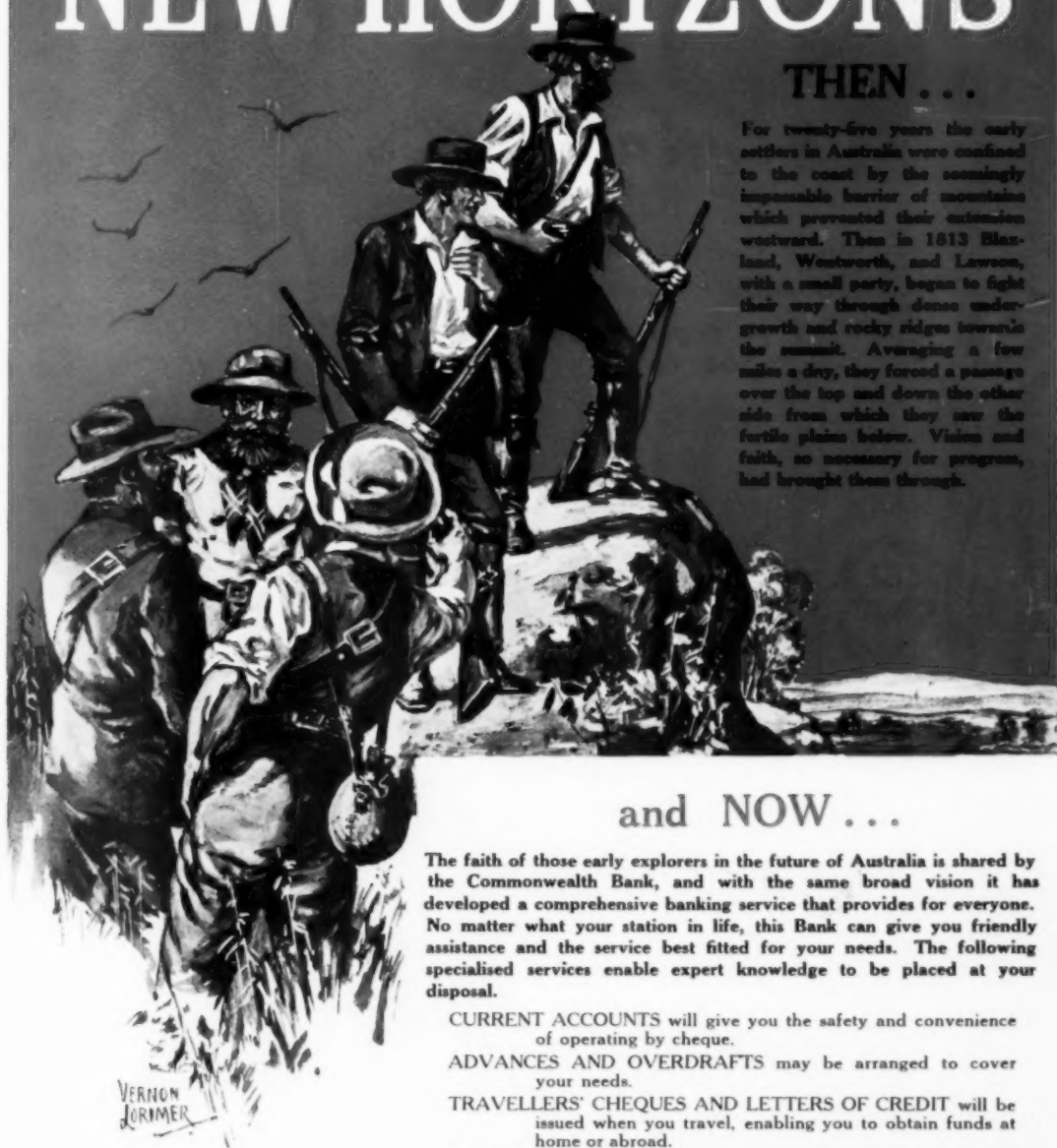
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# THEY FLY LIKE A LADY

## FREIGHTING FROM A SMALL PARCEL TO A WHOLE PLANT

(Contributed by E. K. Green.)

**I**N the air transport game, where the experts look over the lines of an aircraft with eyes as critical as those of a corsetiere examining her latest model, they don't judge the Bristol Freighter by her looks.

At Essendon airport, Melbourne, the other day, where one of Australian National Airways' Freighters was loading up for an afternoon run to Tasmania with a miscellany of cargo, I overheard two ex-R.A.A.F. "types" discussing her . . .

"I often wonder, looking at one of those Freighters, how the hell they fly . . . and yet the pilots swear by them. They would sooner fly them on a DC-3," said one.

And the other answered, "They fly like a lady; and work like a slavey."

And there, if you want the story of the Bristol Freighter Type 170, in "bovrilised" version, it is.

**T**HE Bristol wasn't made to look pretty. She was made to work. And in the days before the jet dream became a reality she looked a lot prettier on Britain's aircraft industry account books than a lot of aircraft with classical profiles.

While they were costing plenty in publicity costs and agency retainers and earning little, the snub-nosed, splay-wheeled, verandah-winged, box-car-like Bristol was bringing in the francs, pesos, drachmas, rupees . . . yes, and dollars, too, of a world that is hard to convince where aircraft is concerned.

They are still bringing them in, because operators in all parts of the world have proved from experience that the "Old Lady" can do her job, whether it be carrying supplies in and bringing ore out from jungle-surrounded mines in South America, ferrying tourists and their cars across the English Channel, carting pigs, goats, cheese and coolies in Indo-China—or doing the all-round, highly organised freight cartage job that is expected of them in Australia.

The Bristol, in this country, at least, is as much a pioneer as the first jet. She is the first aircraft specifically designed for cargo haulage that has been brought here, the first British commercial aircraft bought by an Australian scheduled air-line in many years.

Australian National Airways, whose development of air freighting has been an object lesson to air transport organisations throughout the world, bought the three Freighters they now operate only after extensive testing. They operated one for three months on actual freight services before they signed the contract . . . and the Bristol came through those tests well.

With A.N.A., freighting had long ceased to be a sideline to passenger haulage—"making weight with freight." It was already a full-blown service with a big market to serve and develop.

Already three DC-3's were regularly on the job. The absorption of three more aircraft, Bristol Freighters, into the cargo fleet, more than doubling its capacity, allowed a tremendous expansion.

The great maw of the Bristol's forward-opening nose doors was wide open for all types of cargo—much of it of a size that could not previously be handled by the side-doored types in service here—and A.N.A., with its widely-developed and experienced organisation, found it the type of vehicle they had long wanted.

There was a time, not so long ago, when it was reckoned that the place of aircraft in cargo transport began and ended with rush, luxury and perishable goods.

That, of course, was before the Berlin Air Lift . . . but it was a theory that had been

disproved long before in Australia; immediately after the war, in fact.

It was in December, 1945, that A.N.A. decided to establish a separate freight division, and there were some of them who doubted the wisdom of the move.

I wonder what those doubters would have said had they been standing by recently when A.N.A. loaded a 3½-ton cast valve gate into one of their Freighters and flew it off to Tasmania, where it was urgently needed for a hydro-electric job, with as little fuss as if it had been a sewing-machine in pre-war conditions.

I wonder still more what they would have thought if they had looked with me at a routine report received by A.N.A.'s Essendon airport manager (Mr. Frank Lukis) when he came on duty one day at 9 a.m. It showed that 47,000 lbs. of freight had gone out of the airport on A.N.A. freighters and passenger aircraft up to that hour of that day. Such reports are commonplace.

Most important of all . . . there was nothing about the type of freight to distinguish it from the goods being handled by freight departments of railways, shipping or trucking companies.

The company's Freight Superintendent (Mr. I. G. Webster) lists that fact as the most notable development in the business. Airlines do not handle "air express" these days, he says. It's plain air cargo, and has been since February, 1946, when wartime priorities were lifted.

"The small parcel sent by an individual of 'air express' days has become now a pile of cartons and cases; the odd spare part for a piece of machinery has become whole machines—in fact, a full complement of machinery for a factory," said Mr. Webster.

That factory story is no fable. It has happened several times already to A.N.A. The first time was when Austral Bronze Co. Ltd. decided to set up a subsidiary factory in Hobart. They shipped the whole plant by A.N.A.'s freight service . . . 40 DC-3 loads in three phases at a period of a month each.

By the time the last phase had started, the machinery already taken in was in full production, and there was little or no time lag in the whole change-over process. The air lift of this cargo was scientifically planned so that installation could begin and develop methodically.

Austral Bronze reported that the arrangement had saved them £6,000 in estimated loss of production!

Silk and Textile Printers took their factory from Sydney to Hobart the same way; and when Repco put their new factory into Launceston they dispatched eight DC-3 loads of equipment from Melbourne.

Each of these companies considered that their venture was well repaid in reduction of production loss, in continuity of business relations and service to customers.

If the Freighters had been operating then the jobs could have been carried out even more expeditiously. With its 10,800 lbs. payload, and 2,440 cubic feet of space—plus the front-end-opening doors—machines that had to be taken down partially could have been shipped complete. Handling could have been reduced.

That 3½-ton cast valve gate is the biggest single item shipped so far, but the entry of the Freighter has opened wide opportunities for air cargo development.

Take cars and car bodies, for instance. The smaller ones cost only about £6 more to ship by air than by sea. They require no protection from weather or spray, suffer no handling damage, and are loaded and discharged without delay. Already two cars or car bodies a day are being handled between Melbourne and Tasmania, and the traffic is growing. There are thousands to be shifted.

It has been the same with animal cargoes. The odd dog or stud animal of a few years back has now become whole 'plane loads of beasts, travelling comfortably, peacefully and in good condition to new homes, markets, shows or sports meetings. Even zoo animals—

You may wonder why it is that cargoes of stoves, washing machines and the like go out in a regular flow by air. Speed of delivery and the advantages already listed are part of the story. Another substantial part is the packing. Articles shifted by air require practically none . . . and that saving is listed in terms of £2 a stove.

Stockings, hats, wool, breakfast foods, bulky furniture, mattresses, prams, shoes . . . wrapped in brown paper, in cardboard cartons of up to 100 lbs. weight, in canvas bags . . . they make up a constant bulk flow. Even ice cream in insulated canvas containers.

Peters of Melbourne regularly shipped about 20 tons of ice-cream by A.N.A. to Tasmania each week during the winter. In the summer that will climb to 40-45 tons. And in early October there was 20,000-30,000 lbs. of meat leaving the mainland each week for Tasmanian tables by A.N.A.

Where time is the No. 1 factor . . . as with drugs, serums, newspapers, and other urgent or perishable goods . . . A.N.A. takes a practical viewpoint. It is labelled specially "Must Ride" and goes out on the first aircraft after delivery to the airport. The company makes no extra charge for this, and uses the privilege sparingly. It can control its cargo flow better that way.

And that flow takes some controlling. Here, if you are interested in statistics, is a table of air freight development taken from A.N.A.'s books:

(Continued on page 212)



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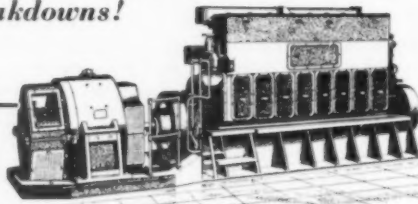
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# MINERAL EARTHS FOR INDUSTRY

S. N. RODDA & CO. (S.A.) PTY. LTD. OPEN NEW PLANT

SO great has been the demand for Mineral Earths and associated materials produced by S. N. Rodda Pty. Ltd., of Victoria, that a new associated Company has been formed which has recently commenced active production in South Australia. Known as S. N. Rodda & Co. (S.A.) Pty. Ltd., the new Company will carry on the same progressive policy which has kept S. N. Rodda Pty. Ltd. in a leading position in this industry for so many years.

Erected only after a careful study had been made of the latest overseas milling techniques, and with the knowledge gained from years of experience in active and successful production, the new factory is believed to be by far the most modern of its kind in Australia and equal in efficiency to any similar plant in the world.

THE new plant of S. N. Rodda & Co. (S.A.) Pty. Ltd. has been constructed and laid out as a unit to suit mineral earths production, and special attention has been given in the new premises to the ventilation, dust control and materials handling problems encountered in processing. Incorporating all the best features of the earlier plant, the new factory is the site for additional precision milling equipment which, in association with the Melbourne output, will double the present production potential while retaining the same high standards which have always been associated with Rodda products.

In order to further this reputation for excellence, and to keep abreast of every new development throughout the world, the latest mechanical and electrical control devices have been added to standardise products within the narrowest possible commercial limits. In doing this, the two companies are making a valuable contribution to the many Australian industries and public undertakings dependent upon them for industrial minerals and fillers.

## COSTS AND MECHANISATION.

In view of the existing shortage of labour, considerable attention has been devoted also to the need for additional mechanical aids to manufacture. By adopting a policy of full mechanisation in both mills, it has been possible to offset, to a large degree, the tendency towards increased costs which is overtaking industry to-day.

By attacking this problem at the base, i.e., raw materials, Roddas have been able to render an additional service to the large structure of industries to which they supply the fillers and extenders necessary for the pro-

duction of such diverse commodities as rubber, paper, paint, leather, pottery, porcelain, bricks, tiles, arc-welding electrodes, bituminous coatings for water mains, insecticides, and so on.

## AUSTRALIAN TALC.

At present supplying the Australian market with large quantities of the highest grade talc suitable for toilet talcum, as well as for industrial purposes, Roddas will soon have their South Australian plant in operation for producing additional supplies of this commodity.

With increased quantities of Talc available, including types equal to the best imported, they will then be in a position to fill the requirements of the Australian market as well as contributing substantially to the export potential. Used extensively in making toilet talcum, pills and tablets, rubber, paint, bituminous coatings, porcelain and electrical work, talc is also used in foundries and similar establishments.

## WHITING.

Occupying perhaps a third of the production capacity of the two Companies, sufficient whiting is being manufactured for local needs and for export to nearby countries. Consisting of processed limestone of marine organic origin containing approximately 98 per cent. calcium carbonate, this is milled to finest standards.

Under the control of Roddas from the quarrying of the raw material until the despatch of the finished product, sales of whiting have doubled in the last year, and show signs of continuing this upward trend. This product finds its widest use in the manufac-

ture of ceramics, kalsomine, rubber and paint, and in the various food industries.

## CERAMICS.

Supplying a range of clays, felspar, silica, fluospar, calcium carbonate, steatite and other minerals for bodies and glazes for the ceramic industry, Roddas have a full-time laboratory staff constantly engaged in the development and experimental utilisation of ceramic materials.

Producing household ware and heavier industrial goods for some time, Australia is at present making substantial extensions to her production of ceramic ware within the limits of available labour. By doubling their production since the end of the war, Roddas, in addition to keeping pace with expanding local needs, are already exporting ceramic materials to New Zealand.

## CONTINUITY OF SUPPLY.

In addition to the vastly increased production capacity in all materials made possible by the establishment of the new Company, a programme of extended activities has been launched in order to bring under unified control all mineral milling operations from the original winning of raw deposits to the final packaging of processed materials.

In this way much wasteful and uneconomical handling has been eliminated, while continuity of supply is guaranteed. This, with the new machinery which is being installed for utilising modern multi-ply paper dust-proof packaging, permits S. N. Rodda Pty. Ltd. and S. N. Rodda & Co. (S.A.) Pty. Ltd. to face with complete confidence the increasing response of Australian and overseas markets to the unsurpassed quality of their products.

## THEY FLY LIKE A LADY

(Continued from page 209)

Period	Lbs.
1946—	
January-June .....	4,413,686
July-December .....	8,891,240
1947—	
January-June .....	9,743,387
July-December .....	13,769,712
1948—	
January-June .....	17,153,718
July-December .....	20,086,568
1949—	
January-June .....	19,930,520
July-December .....	29,188,313

(1949 figures are artificially affected by petrol rationing. Many charter flights had to be refused.)

There is the stuff and the bulk of what air cargo means now in the aircraft industry, but there is still a fascinating story to be told.

It deals with the impact of air cargo on trading and industry generally.

It has given birth to new industries. The development of the Winterset, Orr Vale Gardens, confection pack of strawberries shipped regularly from Brisbane to Sydney and Melbourne markets—fresh and perfect on delivery to the consumer—is a direct research development of air freight.

The building of a big steady market for Mildura fruits in Tasmania, and the fresh fruit and vegetable supplies that arrive from all over Australia on the big Eastern city markets are others. Almost every bean and pea eaten in Melbourne in the past winter has been air freighted from more temperate climates.

Air freighting has aided industrial dispersal, too, by providing fast freight services. But a most notable impact has been in the lift it has given to the country trader.

He need no longer carry big stocks of goods,

with thousands of pounds of capital tied up. To-day he can get his samples, sell on those, and give city service by using air cargo to meet his customers' demands.

The business man no longer looks reluctantly at air freight rates in Australia. He offsets them against resultant savings and gains. He finds it means bigger profits to him in the long run, and a better service to his customers.

It's a fascinating story that is carried on the wings of A.N.A.'s three DC-3 and three Bristol Freighters . . . and it is carried in large part by every airliner that leaves an airport. Passenger payload to-day is a poor measurement of airline economics. Freight makes up for any lightness in passenger loads.

And though passenger business is booming, air freight men declare confidently that the day is not far distant when cargo will be the main support of the airlines. It will outstrip passenger business just as it has in every other form of transport . . . except trams!





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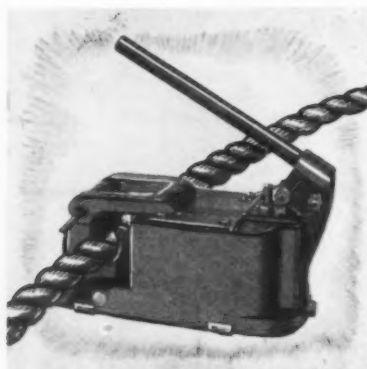
## CABLE CUTTER

that goes to the cable



ROPE IN PLACE

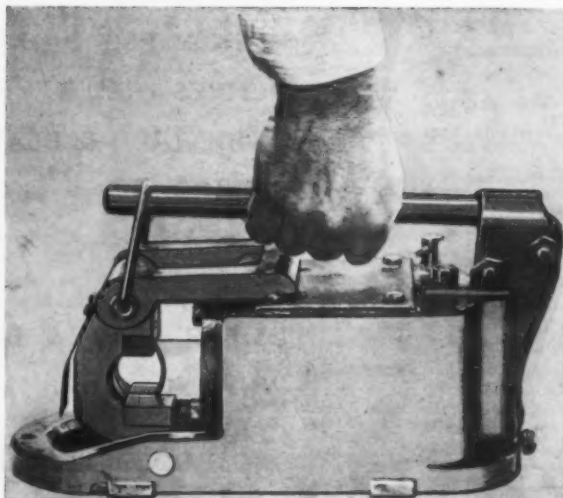
Wire Rope shown in position. The cutting blade requires no adjustment, grips firmly any standard commercial grade of wire rope or cable up to maximum rated capacity. The latch swings over and the Hydrashear is ready to cut.



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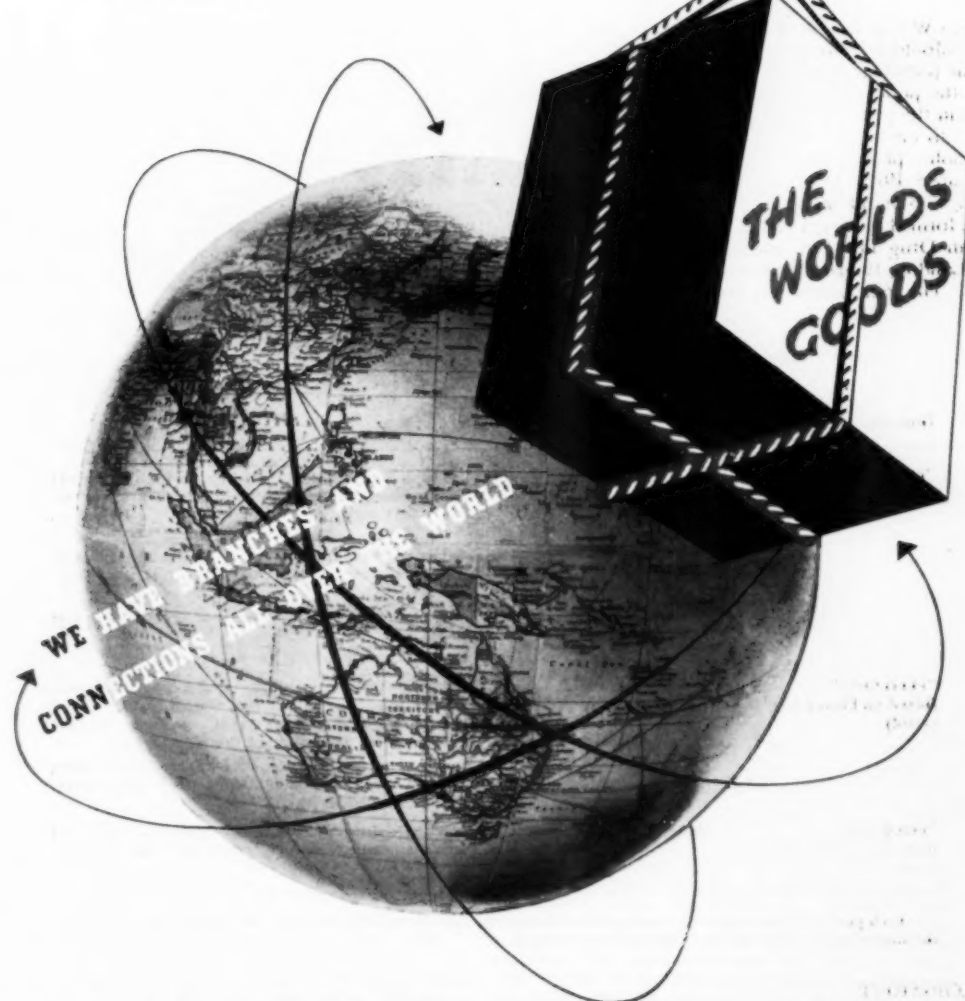
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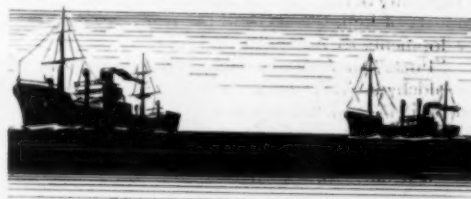
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# BEETLE and ELLITANE

## MOULDING POWDERS-RESINS-ADHESIVES

### BEETLE-ELLIOTT LTD.

Beetle-Elliott Ltd. stands behind the rapidly expanding Australian plastic industry as the major supplier of plastic intermediates. With a factory in operation in Sydney; another unit commencing manufacture of "Beetle" moulding powders in Melbourne early in 1950, and plans for the construction of a modern factory at Highett, Victoria, well advanced, it is considered that all demands for thermo-setting plastic intermediates can be met in the future.

World War II witnessed a huge increase in the use of plastics. Moulders, fabricators and engineers quick to realise the potentialities of the new materials and to capitalise on the public demand for articles superior to those available in the past, expanded their plants to develop new ideas and to modernise and re-design old lines.

Phenolic plastic intermediates had been made in Sydney since 1928. The war, however, demanded new materials, as a result of which Beetle-Elliott Plastics Pty. Ltd. was formed in May, 1944 as a subsidiary of Elliotts & Australian Drug Pty. Ltd. and British Industrial Plastics Ltd. of London, England, a pioneer in the British plastics industry. The joint venture so established was later con-

verted into a public Company, Beetle-Elliott Ltd., in which Drug Houses of Australia Ltd. and B.I.P. still retain a substantial interest.

The new company which took over for Australia and New Zealand the "Beetle" and "Scarab" trade marks, manufacturing rights and processes, very quickly produced "Beetle" cements which were an essential item in the construction of the De Havilland "Mosquito" aircraft and later developed "Ellifilm", a tough durable coating for high speed water craft. At the end of the war, production was changed over to meet the demands of industry and has proceeded at an ever-increasing tempo since that time.

#### PRODUCTS AND END USES

The major products manufactured and the range of applications can be seen by reference to Table 1.

TABLE 1

Trade Name	Product	End Uses
<b>"BEETLE"</b> (based on urea or melamine)	Moulding Powders	Tableware, buttons, radio cabinets, switch plates and boxes, house connection boxes, closures, kitchen canisters, toilet seats, reflector bowls, light shades, toys and novelties.
	Resins	Laminating (furniture panels, bar tops, wall panelling), wet strengthening of paper, textile treatments, e.g., shrinkage control, crease resistant finishes.
	Cements	Bonding of plywood, furniture panels, boat and caravan construction.
	Coating Resins	"Sanitary" and industrial enamel finishes.
<b>"ELLITANE"</b> (based on Phenol and/or cresol)	Moulding Powders	Electrical switches and plugs, radio cabinets, buttons, closures, telephone hand sets, meter cases, motor housings, vacuum cleaner ends, washing machine agitators, bread bins, kitchen tidies, and toilet seats.
	Resins and Resin Solutions	Laminating paper and fabric, electrical insulation, sealing porous castings, core-binding, casting, bonding of plywood and furniture panels.
<b>"EMULTEX"</b> (Polyvinyl acetate emulsion)	Water Emulsions	Protective coatings, water paints, adhesives, paper and chipboard coatings, textile treatments, leather treatments.

Each product is divided into a number of grades so that manufacturers have a wide range from which to select the material best suited to their particular application.

#### DEVELOPMENT

Developmental work is centred in well-equipped laboratories attached to the Sydney plant, while a textile laboratory is being established in Melbourne.

Close liaison is maintained with overseas associates, viz. British Industrial Plastics Ltd. and Revertex Ltd. in England, and the American Cyanamid Co. in America. Technical information from these sources, plus the brains and ingenuity of our own chemists and engineers, has ensured products of high quality, and the ready availability of new developments to Australian industry.

"Firsts" in Australia include the production of urea-formaldehyde AXT grade moulding powders towards the end of 1946, and the superior AX grade in 1949; "gap-filling" urea-formaldehyde cements; self-hardening urea-formaldehyde cements; polyvinyl acetate emulsions; and melamine formaldehyde resins for laminating, for

paper-treatment, and for hard heat-resistant lacquers in white and other delicate shades.

The introduction during 1949 of "Beetle" melamine moulding powders manufactured by the Beetle Products Co. Ltd., England (later to be manufactured in Australia) marked a milestone in the history of Australian plastics. Mouldings from these powders are durable, light-fast and possess excellent electrical characteristics. They will create intensive interest when released shortly in the form of tableware and later as buttons.

The development of resins for the improvement of textile properties is also another interesting avenue of use, and a contribution towards better living. More will be heard of these resins in 1950!

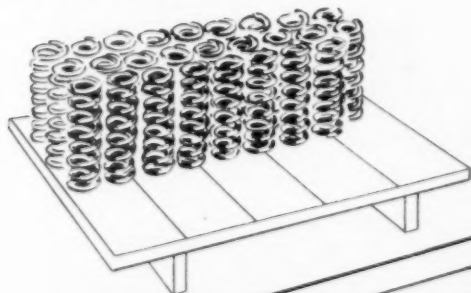
Quietly and unobtrusively, developmental work is proceeding, so that when industry requires plastic intermediates, Beetle-Elliott Ltd. is ready with the right resin or moulding material to meet the need.





#### PRODUCTION HARDNESS TESTING MACHINE

*This machine, which has been recently installed in our works, lends itself to hardness testing in mass production and is particularly adaptable to testing coil springs.*



Tough, thorough tests for tough springs! Yes—they've an exacting job to do . . . they must be accurately made. Since its beginning in 1890, the Pioneer Spring Co. has specialised in the production of springs for a wide range of Industrial and Vehicular uses. Helical, laminated, volute . . . whatever the spring type—only the best materials are used. Pioneer

Springs are manufactured by the most modern precision methods; throughout each stage they are subjected to close supervision—to thorough tests. Proof of their popularity and reliable service may be found in their continuous use by Australian, State, and New Zealand Government Railways and by a large section of the Automotive Industry. Enquiries concerning local or export business is invited.

# Pioneer Springs

26/EP. 7.

FAMOUS SINCE EIGHTEEN NINETY  
Advertisement of the Pioneer Spring Co. Ltd., McEvoy St., Alexandria, Sydney, Australia





## STAR MACHINERY PTY. LTD.

*Engineers and Contractors to Government Departments, Etc.*

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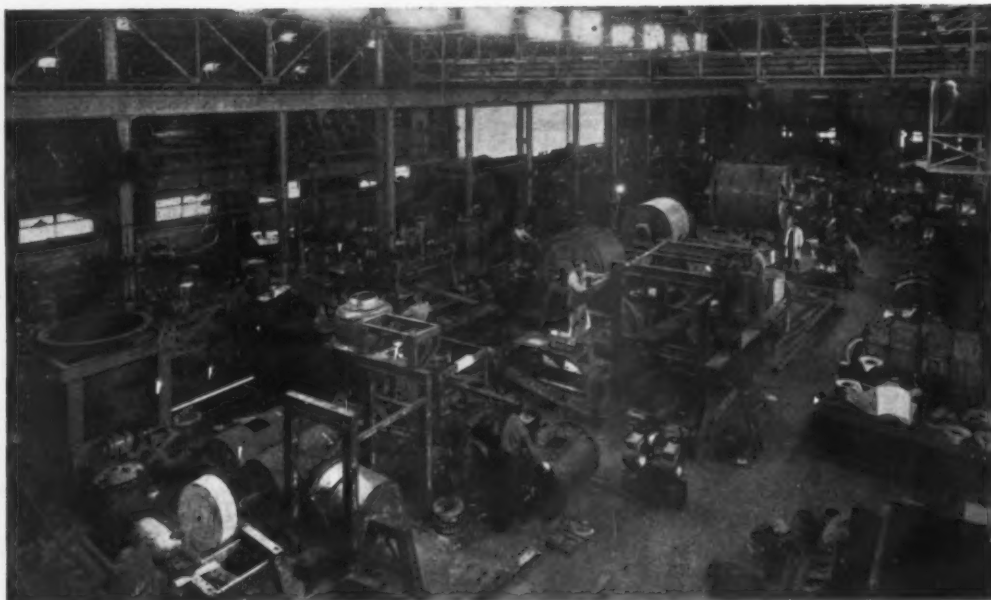
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A section of the factory of Star Machinery Pty. Ltd.

*Specialists in:*

Filter Presses, Chrome Steel Ball Mills, Porcelain Lined  
Pebble Mills, Granite Roller Refiners, Cone Mills Mixers  
and other Paint and Lacquer Manufacturing Machines. Ink  
Mills, Pharmaceutical Machinery, Confectionery Machinery,  
etc., etc.



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- "LAMCO" Flat (Single, Double, or 3-Ply).
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- "DOUBLEFF" Endless Cotton Woven Belting.
- Dunlop, Goodyear and N.A.R.M. Rubber and Canvas Flat Transmission and Conveyor Belting.
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14 Maritime Buildings, Petrie's Bight, Queen St.,  
BRISBANE, QUEENSLAND.



# FORGING AHEAD

In Equipment and in Methods, Drop Forging in Australia is kept up to World Standards

THERE have been tremendous advances in the manufacturing techniques of all metalworking industries in recent years, resulting in continued improvement in the properties and the quality of the material produced. The products of all methods of fabrication have their respective fields of usefulness, but it is the fields which require parts of high strength with a minimum of weight that the products of the forging industry are predominant. As speeds of travel and of machinery increase, forgings become more necessary. As light weight becomes more desirable, forgings become more attractive. As more use is made of hard, heat-resistant alloys on which machining is difficult, the ability to forge to close tolerances becomes more essential.

NO method of metalworking is older or more spectacular than forging. None has been more neglected by industry in general. And developments in other metalworking industries have been more matched in drop-forging techniques.

That the old methods produced remarkably good results is not to be denied, but the demand for forgings in many different alloy steels and light alloys to the standards that are now specified has necessitated the intro-

presses. Forging rolls are used for specialised work.

Smith forgings (sometimes known as hand, hammered, flat die or blacksmith forgings) are produced on steam or pneumatic hammers. In the steam forging hammer the ram, direct connected to a piston, is raised and lowered by pressure of steam in the cylinder above it. The piston is double-acting so steam can be used to raise the ram and also to augment or retard the force or gravity in lowering the ram. The force of blow can be controlled from a light tap to the maximum possible. In the pneumatic hammer the power is supplied by an electrically-driven double-acting compressor cylinder interconnected with a double-acting power cylinder. With stock tools, skilled A.F.E. operators produce forgings of surprising accuracy. The rate of production is relatively low, of course, and smith forging is principally used when the quantity of forgings required is too low to justify dies.

Drop forgings account for most of the tonnage produced commercially. They are formed by impact pressure using closed impression dies in steam drop or gravity drop hammers. The steam drop hammer is similar in operation to the steam forging hammer except that the design is such that the top and bottom dies can be held in alignment. Control is effected through a throttle valve which can be opened to any point to regulate the force of the blow. This throttle control is usually made with a treadle so the operator can control the hammer as he manipulates the work. In the gravity drop hammer the top holding the upper die is raised by means of a heavy belt or rope which passes around an electrically-driven drum. The part is processed through a series of die impressions which are generally combined in a single set of dies. The complete process of manufacturing a part by drop forging is illustrated and described here.

Machine forgings (also known as upset forgings) are produced on horizontal double-acting presses known as upsetters. The heated bar stock is placed between a pair of gripper dies which close on the work before the header slide pushes a punch against the plastic metal to force it into the die impression. Simple parts can be produced in one pass. Several passes can be incorporated in one set of dies and punches, as shown in Fig. 4.

Initially, press forging was used for parts of fairly symmetrical shape, but in the industry to-day it is used for irregular work with preliminary operations for blocking and bending for final forging.

Stock can be drawn out to long slender sections in forging rolls. The roll dies are semi-cylindrical. Stock is placed between them when they are in the open position, and rolled towards the operator, who again places the stock between the rolls for the next pass. Often the operation is used as a preliminary

to finish forging in a press or hammer. Blanks can be produced rapidly which will reduce the number of subsequent operations.

Each method of forging can be used independently or in combination with other methods. Smith or roll forging, for example, is frequently a preliminary to drop or press forging. Sometimes work is blocked in a hammer, finished in a press; sometimes the reverse is true.

## A.F.E. FORGE EQUIPMENT.

The A.F.E. forge is equipped with 24 hammers, ranging from 200 lbs. to 12,000 lbs., an Ajax upsetter, a Maxipress, and a set of rolls.



Fig. 2 (Above). Suitably tested bar stock is rolled in impression, (a) to the shape shown at top, the metal being thus located in the most suitable position for flow purposes. After having been worked in impression (b) to approximate shape and dimensions, it is given a few blows in the stamping impression (c) which brings it within tolerance, as shown in middle illustration. Lower right is the forging after being removed from the bar with cut-off (d). The flash is removed with the trimming tools, and the forging (lower left) is ready for heat treatment.

Their 12,000 lbs. Chambersburg steam hammer is said to be the largest steam drop hammer in Australia. Typical of the work produced on this giant (on which capacity is at present available for quantity production of big forgings) is the 40 in., 161 lb. crankshaft for the new K. L. Bulldog Diesel Tractor, and the front axle for the International Harvester Tractor which measures 42½ in. x 5½ in. x 4 in., and weighs 57 lbs.

To this modern forging equipment comes the raw material after the Technical Department has subjected it to inspection and metallurgical testing for suitability. Heated in modern furnaces, the raw material is shaped by thoroughly trained operators using a technique that is carefully kept abreast of any applied in the world to-day.

## FORGINGS FOR ALL INDUSTRIES.

Drop forgings for heavily stressed engine and transmission details have long been the selection of the world's foremost automotive and marine manufacturers. Designing engineers obtain maximum safety and efficiency by including an extensive range of forgings in their productions.

In the "Holden" car, a total of 84 A.F.E. forgings are contributing in no small measure to the fine reputation for ruggedness and dependability which is being built up by this Australian product.

Marine productions provide use for shackles, eyebolts and all those components which must stand up to shock loads, stress fatigue and the effects of exposure to all weather conditions.

Strength, rigidity and the ability to withstand impact are primary essentials in the construction of agricultural and earth-mov-

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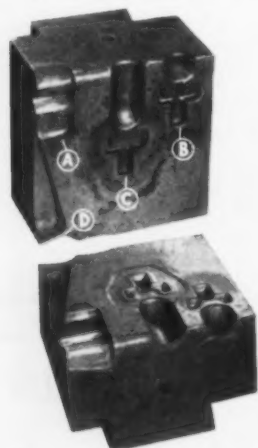


Fig. 1. Above are shown two specially treated steel die blocks which have been machined and had impressions cut in them as follows: (a) Rolling, (b) Roughing, (c) Stamping, (d) Cut-off.

duction of scientific control throughout all phases of manufacture. This applies from the design of the die and the receipt of raw materials to the despatch of the finished forgings.

In Australia, the claim to leadership in this field is made by Australian Forge & Engineering Pty. Ltd., of Parramatta Road, Lidcombe, N.S.W., and to review the accomplishments studying the short history of this organisation and to witness what is being effected at the present time—as The "Manufacturer" was permitted to do recently—is to realise that here is a company which has as its aim the greater acceptance of forgings for all applications and the establishment of high standards to ensure the permanence of this form of metalworking in modern industry.

In August, 1930, the company was first formed by the late Mr. R. W. Perkins, under the name of the Australian Drop Forging Co. Ltd. Since then the A.F.E. organisation has grown from a modest factory with only three drop hammers and three pneumatic hammers as equipment to a plant which today operates on 151,835 sq. ft. of floor space, on 9½ acres of land, and without hesitation claims to be the largest Drop Forging works in the Southern Hemisphere.

## TYPES OF FORGING.

Basically, metal can be forged by impact or pressure. When forged by impact in hammers the part can be formed by dies which are flat or slightly shaped (smith forging) or in closed impression dies (drop forging). Forgings formed by pressure are made in forging machines or in mechanical or hydraulic

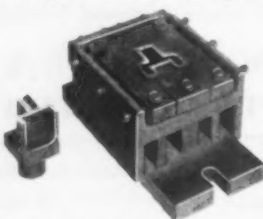


Fig. 3 (Above). Specially designed trimming tools for the removal of flash.





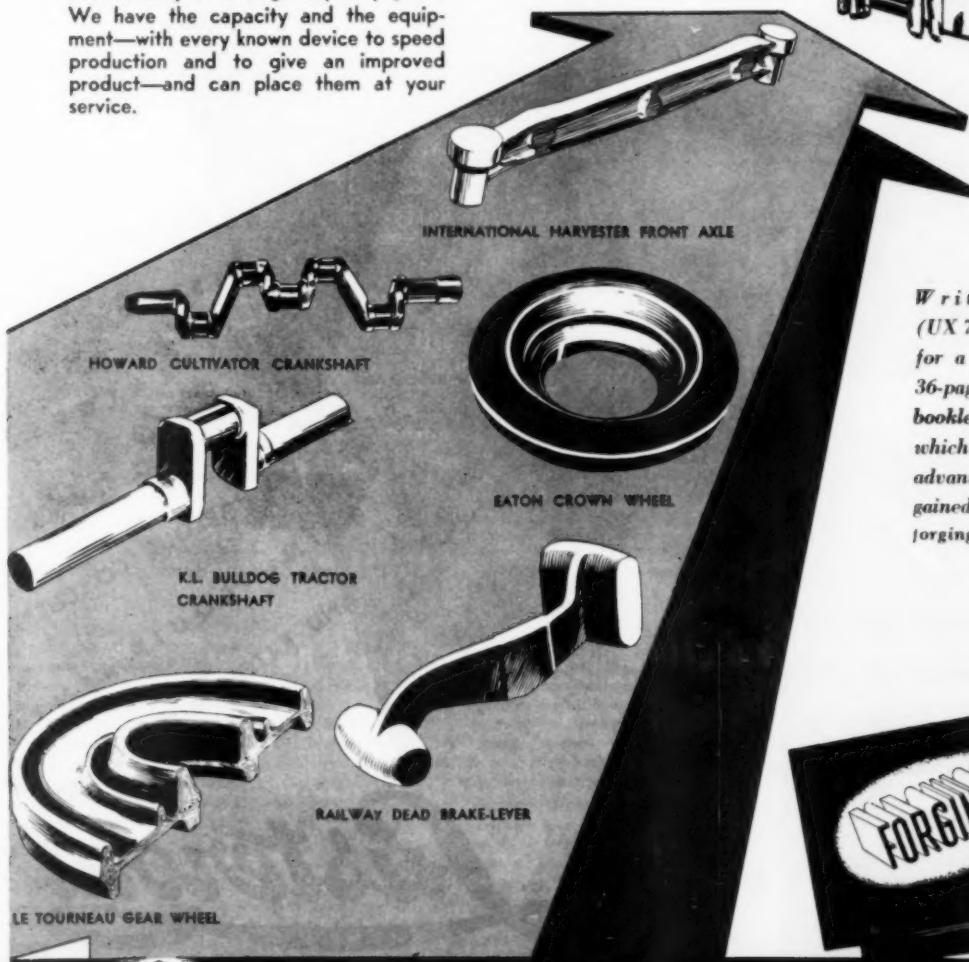
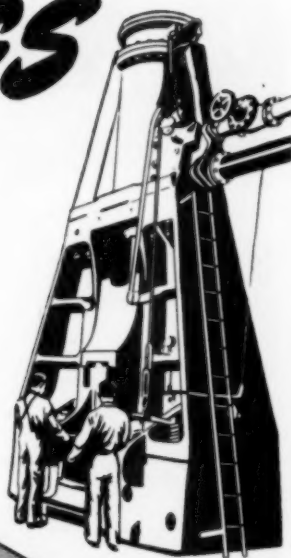
# BIG FORGINGS

*from Australia's*

**LARGEST STEAM**

**DROP HAMMER**

Big forgings can only be produced economically in a large capacity plant. We have the capacity and the equipment—with every known device to speed production and to give an improved product—and can place them at your service.



Write, phone (UX 7473) or call for a copy of our 36-page illustrated booklet, "Forgings," which tells of the advantages to be gained by using forgings.



**Australian Forge & Engineering Pty. Ltd.**

PARRAMATTA ROAD, LIDCOMBE, N.S.W.



*Where surface protection is vital.....*



*you can depend on*  
**LUSTEROID**

AIRCRAFT  
UPHOLSTERY  
SEA CRAFT  
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If your plant turns out similar products that need *lasting* protection, Lusteroid can help you enormously. Whatever you require — it may be Lusteroid Auto and Industrial Lacquers, Yacht Enamels, Marine Varnish, or Q.D. Enamels (for interiors and exteriors — brush or spray) — your first move is to get in touch with your nearest Lusteroid factory or distributor *today*.

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## NEW DRUMS FOR OLD . . .

We offer quantity users of steel drums these unequalled services:

- Recovery of damaged drums by exclusive mechanised processing methods that cut costs and recovery time.
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- Conversion of fixed head drums (for liquids) to ring-sealing head types for powders, semi-liquids, greases, etc.
- The supply of recovered drums from our own stocks.
- Purchase of unwanted drums, damaged or undamaged.
- Prompt pick-up in Sydney metropolitan area.

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CONTAINER RECOVERY ENGINEERS AND DRUM MERCHANTS

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## DRUM RECOVERY ELIMINATES BOTTLENECKS

The acute shortage of steel drums for oil, petrol, chemicals and other essential commodities that has been experienced in Australia for many years is being offset to a very substantial degree by the enterprise of R. L. Thomas Pty. Ltd., of 76 Ivy Street, Chippendale, N.S.W., which is an engineering organisation specially equipped for recovering metal containers, reconditioning them and returning them to service.

THIS company operates two efficient plants devoted to drum recovery. The mechanised processes employed are thorough, efficient and economic. Most of our oil and industrial chemical companies have come to rely, over past years, on the facilities of R. L. Thomas Pty. Ltd. to obviate the serious bottlenecks in production that otherwise would unquestionably be caused by the dearth of new drums coming available and through losses from service damage and export.

This company is far from being a newcomer to its highly specialised field of activity and can now claim to conduct the largest and best-equipped works of their kind in the Southern Hemisphere. Established after World War I in which its founders had seen active service, the company was already one of considerable standing and capacity when the last war was declared in 1939. Immediately following the commencement of those armed hostilities, the conservation of drums became an important factor of supply

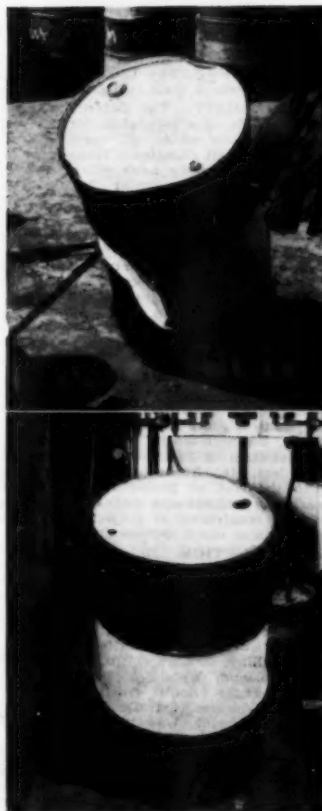
in the maintenance of the armed forces and essential industries.

During the war period, the facilities, including specialist plant designed and built in the company's own workshops, and which had been so energetically developed during the preceding years, worked around-the-clock shifts and were applied wholly to meeting the urgent requirements of the Services.

To-day, although defence needs have returned to normal peace-time levels, these activities are still operating on a 24-hours-a-day basis, and a second recovery unit has been established and is operating to full capacity. The Head Office and No. 1 Plant are at Ivy and Boundary Streets, Chippendale, N.S.W., and the No. 2 Plant is located at 9 Denison Street, Matraville, N.S.W.

As can be readily appreciated when the hard service to which they are subjected is considered, a large proportion of the drums received at the recovery plants of R. L. Thomas Pty. Ltd. are badly battered, rusted

(Continued on page 284)





# The biggest name in the world stands behind **Caterpillar Steelweld** Earthmoving Equipment-

**STEELWELD** earth-moving equipment — which is now being produced in large quantities by Steelweld Pty. Ltd. in their modern, well-equipped factory at Ashley Street, Braybrook, Victoria — embodies all the features of design and durability so essential to low production costs in earth-moving and construction projects.

Including a range of motor graders, bulldozers (angling and straight), cable control units, logging winches, traxcavators (front end loaders), rippers, scrapers, stump dozers, brush rakes, etc., Steelweld equipment is in heavy demand by Government departments and contractors throughout Australia. The following are some of the main features which have placed this equipment in the forefront of Australian industry.

**1. DESIGN.** Steelweld equipment is manufactured under licence from the largest manufacturers in the world of this equipment, namely, Caterpillar Tractor Company, Peoria, Illinois; Hyster Company, Portland, Oregon; Trackson Company, Milwaukee, Wisconsin; Florida Land Clearing Equipment Co., Jacksonville, Florida.

Incorporating the same high standard of quality and interchangeability of the manufactures of their principals, Steelweld receives the direct benefit of the large proving grounds and research laboratories of these companies which enable every item of equipment to be fully tested and proved before release for production.

With the large resources at their disposal, tests are carried out continuously and equipment is improved wherever possible. Any improvements in design are simultaneously released to Steelweld Pty. Ltd., who promptly incorporate them in their own production.

**2. RELIABILITY.** The Caterpillar equipment has built up a reputation for outstanding performance under all operating conditions and in all climates. This equipment, coupled to the world's most reliable tractors manufactured by Caterpillar Tractor Company, ensures highest job efficiency and lowest overall costs.

**3. MATCHED EQUIPMENT.** Caterpillar Tractor Company after many years of experience decided that the only answer to the earthmover's problem was the supply of equipment designed by the tractor manufacturer and matched to suit each tractor. Hence, to-day, we have the production by Caterpillar Tractor Company of equipment matched to the tractor unit, a feature which is also secured in Steelweld equipment.

**4. LOW MAINTENANCE COSTS.** An important feature of Steelweld equipment is the high quality of materials used throughout; for example, the high-tensile alloy plate used in the fabrication of bulldozers, scrapers, front end loaders, etc. These features, whilst adding to the cost of production, ensure long life and low maintenance costs—an important factor in constructional projects where idle time means so much increase in costs.

**5. DISTRIBUTION.** In accordance with Caterpillar policy, an Australia-wide service organisation has been established to serve the user; each territory has a dependable distributor whose name has been associated with Caterpillar in Australia for many years. Caterpillar dealers are: Victoria and Tasmania, William Adams & Co. Ltd.; N.S.W. and Queensland, Waugh & Josephson Ltd.; South Australia, South Australian Tractor Company; Western Australia, Wigmore's Ltd.; Northern Territory, Hastings Deering, N.T. Pty. Ltd.

These dealers all have modern, well-equipped organisations adequately staffed with personnel who periodically visit the Caterpillar Tractor Company to enlarge their

knowledge on service and secure the latest information on the operation of this equipment.

Steelweld have recently extended their factory and increased their productive capacity to meet the ever-increasing demand for their products, so that in the near future they anticipate being able to meet urgent needs reasonably promptly. New products are being continually added to the range, including the "Hystaway," which combines several tools in one—dragline, clamshell, back

hoe, shovel, crane. Another addition is the "Caterpillar" bulldozer, for us with new or used Caterpillar D8, D7 and D6 track type tractors.

So, in a little over three years, Steelweld equipment has come into prominence in coal production, water conservation, building of roads and railways, production of housing materials, soil conservation, land clearing and cultivation, and many other industrial projects so vital to the economic development of Australia.

## OIL HYDRAULIC EQUIPMENT

INDUSTRIAL SERVICE ENGINEERS PTY. LTD.,

of Braybrook, Vic.

Manufacturers and Distributors of the Vickers-Detroit Oil Hydraulic Pumps and Controls in Australia and New Zealand.

**DURING** 1949, Industrial Service Engineers Pty. Ltd., of Ashley Street, Braybrook, W.19, Victoria, completed an agreement with Vickers Incorporated, of Detroit, by which Industrial Service Engineers Pty. Ltd. become the sole licensees for the manufacture and distribution of the well-known range of Vickers-Detroit oil hydraulic equipment in Australia and New Zealand. This agreement is the culmination of years of co-operation between the two organisations and enables Industrial Service Engineers Pty. Ltd. to take a front rank position in the provision of oil hydraulic equipment for the two Dominions.

VICKERS INCORPORATED, OF DETROIT.

Vickers Incorporated, of Detroit, U.S.A., which is a division of the Sperry Corporation, was a pioneer in the development of oil hydraulic actuating equipment and now supplies, we understand, the majority of such equipment used in the United States and, to an increasing degree, in Great Britain and on the Continent of Europe. We quote an eminent authority on oil hydraulic power, Mr. Walter Ernst:—

"By skilful design, superior manufacturing methods and excellent promotional work, Vickers Incorporated has become the outstanding leader in the field of applied hydraulics. Their vane pump is the nucleus about which the entire line of over 5,000 standard units is built."

### RANGE OF VICKERS PRODUCTS.

The range of oil hydraulic units produced by Vickers can be broadly classified in the following list: Rotary vane pumps, variable delivery piston pumps, balance piston relief valves, flow control valves, pressure reducing valves, direction control valves, solenoid operated valves, multiple unit control valves, fluid motors and steering boosters.

These units when used in various combinations, and together with other standard details, can be formed to provide almost any required hydraulic circuit. Vickers have developed very fully the system of using standard units to be built into any type of

special purpose or standard machine, thus enabling hydraulic actuation to be provided economically and simply.

### SERVICE TO AUSTRALIAN INDUSTRY

Industrial Service Engineers Pty. Ltd. is enabled by virtue of its agreement with Vickers, Detroit, to render an invaluable service to Australian industry in the provision of specialised oil hydraulic equipment.

Hydraulics can now be supplied for a wide range of applications such as: Heavy earth-moving equipment, material handling equipment (i.e., fork lift trucks, etc.), machine tool actuation, heavy motor trucks and their accessories, agricultural tractors and their implements, steam boiler stoker units, special purpose machines, the plastic industry, marine applications (i.e., hydraulic steering), hatch door actuations, and any heavy unit actuation. **ENGINEERING DATA AVAILABLE.**

Vickers, Detroit, have always recognised the necessity for the provision of complete engineering data in respect of their products and, as a consequence, there is available an immense amount of information in respect to performance data and installation dimensions covering all their units.

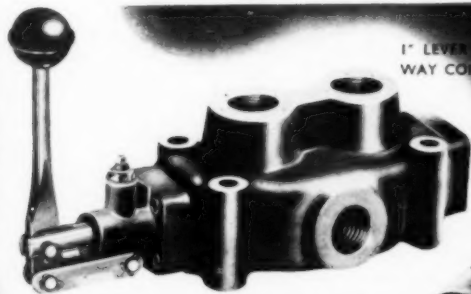
Industrial Service Engineers Pty. Ltd. have all of this data available, and are in a position to design hydraulic circuits and recommend suitable equipment for any type of application. Engineering drawing offices are more and more availing themselves of this specialised service.

### THE UNIQUE FEATURES OF OIL HYDRAULICS.

Whereas the transmission of power by hydraulic circuits has been used for centuries, the development of oil hydraulic circuits in place of the older water systems has been a development of recent origin. It was found that the use of oil as the hydraulic medium provided some fundamental advantages, the chief being that the greater viscosity of the oil has enabled the development of sliding valves and pump components in which the sealing against pressure is provided by metal

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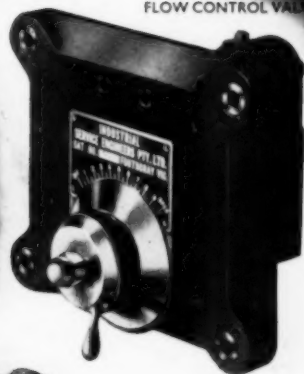


1" LEVER  
WAY CONTROLSINGLE  
PUMP

# VICKERS - DETROIT HYDRAULIC CONTROLS *Predominate*

on modern Earth Moving and Material Handling Equipment.

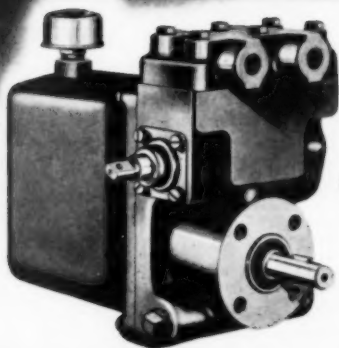
The Vickers range includes pumps, direction control valves, pressure control valves, and solenoid operated control valves.



FLOW CONTROL VALVE



MULTIPLE UNIT VALVES.

VICKERS HYDRAULIC  
POWER PACK.

We design and quote complete hydraulic circuits for actuating:—  
Presses, Broaching Machines,  
Machine Tools, Furnaces, Special Purpose Machines. Vickers-Detroit Hydraulic Pumps and Controls are manufactured in Australia by the sole licensees—Industrial Service Engineers Pty. Ltd.

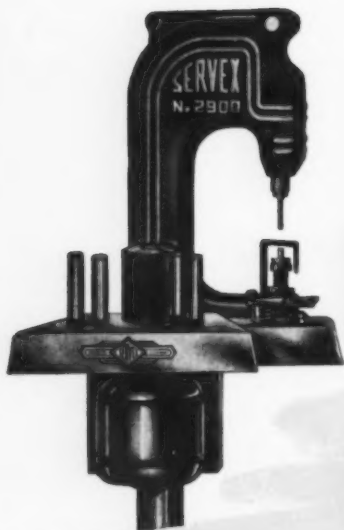
## INDUSTRIAL SERVICE ENGINEERS PTY. LTD.

ASHLEY STREET, BRAYBROOK, VICTORIA, AUSTRALIA

THE AUSTRALASIAN MANUFACTURER



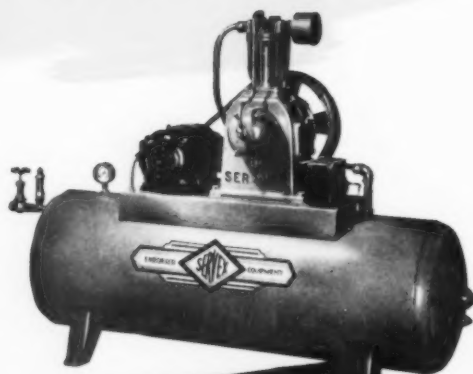
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AUTOMOTIVE INDUSTRY!**



**SERVEX**

**SERVICE STATION EQUIPMENT**

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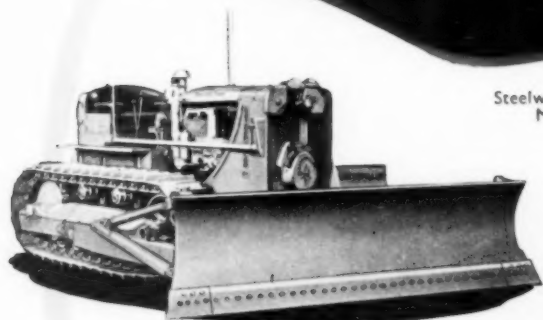
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(Front cable control illustrated.)

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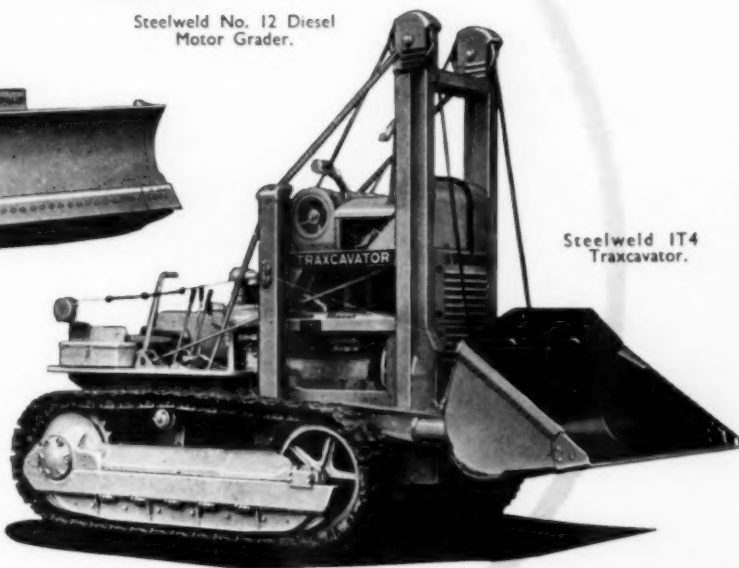
**VICTORIA & TASMANIA**  
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Steelweld IT4  
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Consult your Caterpillar Dealer about:— Bulldozers; Angledozer; Scrapers; Rippers; Cable Controls: (Rear Mounted Double Drum Type and Front Mounted Single Drum Type); Logging Winches; Front End Loaders; Land Clearing Equipment.

Manufactured under license from

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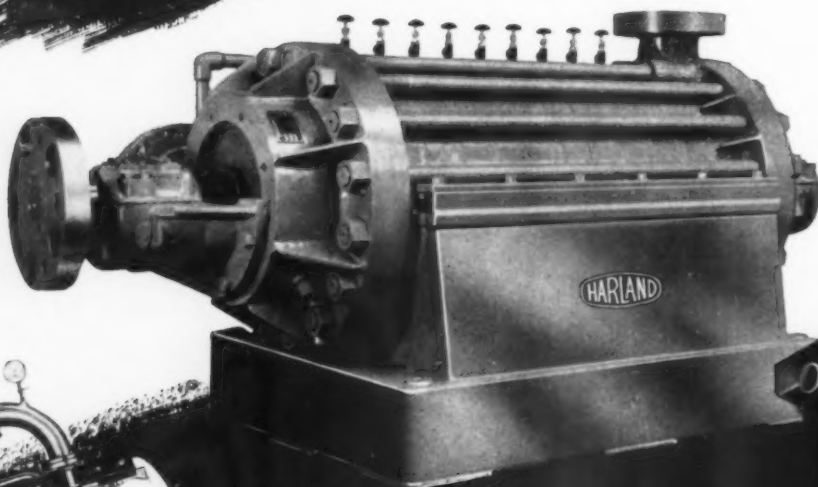
# STEELWELD PTY. LTD.

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Harland Engineering (Australia) Pty. Ltd., manufacturing under license from Harland Engineering, Scotland, offer a wide range of standard pumps to meet almost every requirement, and where pumps for special applications are required Harland Engineers are available to design special purpose units.

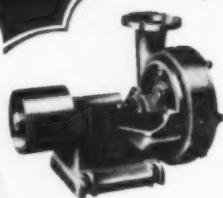


Harland M.S.G. 11.  
Multistage pump - duty  
667 G.P.M. 3138 feet  
head. 1480 R.P.M. 800  
H.P.

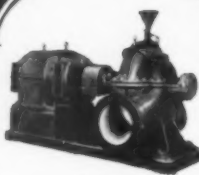
Manufactured under licence from  
**HARLAND ENGINEERING CO. LTD.**  
SCOTLAND



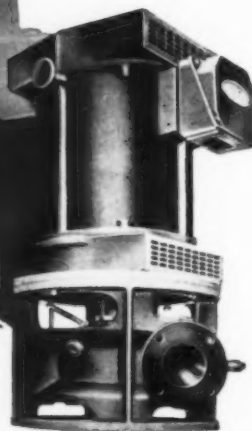
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Ideal for pumping from  
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# Industries In Western Australia



## STATE MAINTAINS INDUSTRIAL PROGRESS

By Ernest Hearn, President, the West Australian Chamber of Manufactures (Inc.)

INDICATIVE of the continued progress of Western Australia's secondary industry is that for year ended 30th September last, factory employment increased by 3.7 per cent., which compares more than favourably with the figure of an increase of 1 per cent, for Australia as a whole.

Heartening as this progress has been during 1949, we in Western Australia look forward with justifiable optimism to the continued expansion of the developmental programme of important State undertakings during 1950, which are so vital to secondary industry progress. Foremost is the opening of the new "A" Station of 25,000 kw. at the South Fremantle Power House towards the end of 1950. The output from this Station, additional to that generated by the existing East Perth Power House, will result in local manufacturers being assured of a continuous supply of electric power, the life-blood of industry.

WESTERN AUSTRALIA compares more than favourably with her sister States, for in addition to an increased output of power, coal production at the Collie mines is expanding and, in addition to the two major companies already operating, it is anticipated that a new company will be in production there towards the middle of 1950. Increased mechanisation of the Collie mines and the opening up of new areas will result in last year's record production of 733,000 tons of coal being considerably stepped up over the next five years. The use of Collie coal as the basic fuel for the manufacture of carburetted water gas is now an established commercial success. Over a period of six months at the Fremantle Gas Company's new Carburetted Water Gas Plant, the operation of the carburetted water gas has provided a solution for the problem of gas production from Collie coal. Erection of further carburetted water gas plants would make this State independent of the supply of N.S.W. gas making coal.

The expansion of dairy products and meat production is envisaged in plans which have been formulated for the development of various areas of Crown Land in the higher rainfall areas of the Albany hinterland, in the southern portion of the State. This long range plan will make it possible, within ten years, to develop one million acres and produce 14,000 tons of meat and 2,000 tons of butter a year, in addition to by-products.

In the East Kimberley portion of the North-west of this State, the production of beef was stimulated by the success of the initial operation of Air Beef Pty. Ltd. The aerial transport of beef from Glenroy Station to the Wyndham Meat Works has written a new chapter in the development of the North-west meat industry.

The South-west power scheme is being pushed forward and the Collie Power Station is being extended at a cost of £300,000. Transmission lines have been erected throughout the South-west and it is

expected that power will be supplied from the Collie Station during 1950. It is anticipated that the cost of the South-west scheme will be approximately £1,000,000.

One of the immediate consequences of the currency devaluation was a decided change for the better, in the outlook for the goldmining industry in Western Australia, and there is promise of big developments on the Yilgarn gold field. A soundly based goldmining industry constitutes a valuable reserve against economic difficulties which may arise in other industries.

The acceptance by the State Government of the Tydemann report for the extension of the Fremantle Harbour, while a long range scheme will eventually provide the main port of the State with facilities equal to any in the world.

Last year, important administrative changes were made in the Railway Department, and various decisions designed to increase the system's efficiency were taken. While the effects of these decisions will not be apparent for a year or two, due to the difficulties of materials and manpower common throughout Australia, the natural obstacles of vast distances common to this State will be considerably removed.

Notwithstanding the fact that the State was severely handicapped by the nation-wide coal strike last year, as I indicated in my opening remarks, progress has been made in the field of secondary industry. The first tractors manufactured in Western Australia came off the assembly lines towards the middle of last year. A number of these tractors have now been delivered, and the production is being gradually stepped up to the target figure of eight per day.

A new concrete pipe factory is being established on 11 acres of land at Belmont, within five miles of Perth, while an Eastern States firm recently established a factory at Maylands for the manufacture of steam generators.

During 1949 a Company was established at Welshpool for the treatment of iron and steel products to prevent corrosion.

Additional timber mills have been established in the lower South-west of the State, which will materially increase the output of this very important industry.

The possibility of a steel industry being founded in the State is a step that would encourage other industrial enterprises and greatly strengthen Western Australia's defences of its huge coastline. Despite early teething troubles inevitably associated with a new industry

(Continued on page 255)



Mr. ERNEST HEARN,  
President, the West Australian Chamber  
of Manufactures (Inc.).



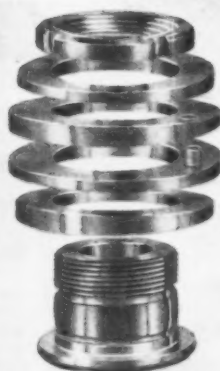
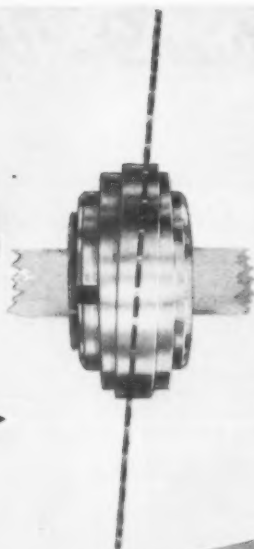
Tractors manufactured by the Chamberlain Industries Ltd., Welshpool, W.A.

THE AUSTRALASIAN

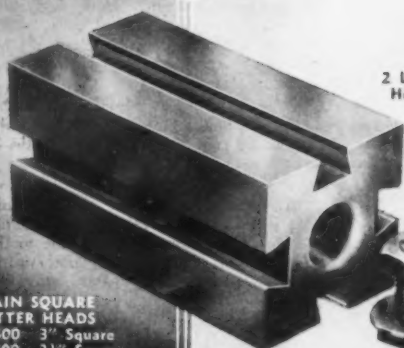


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# FOR THE WOODWORKER

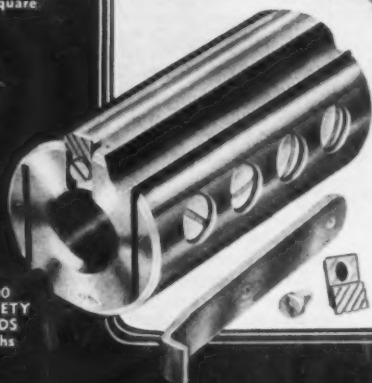
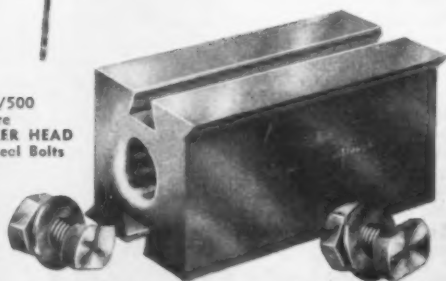


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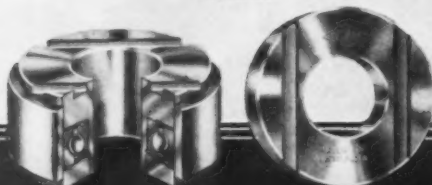
Series LSM/500  
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High Tensile Steel Bolts



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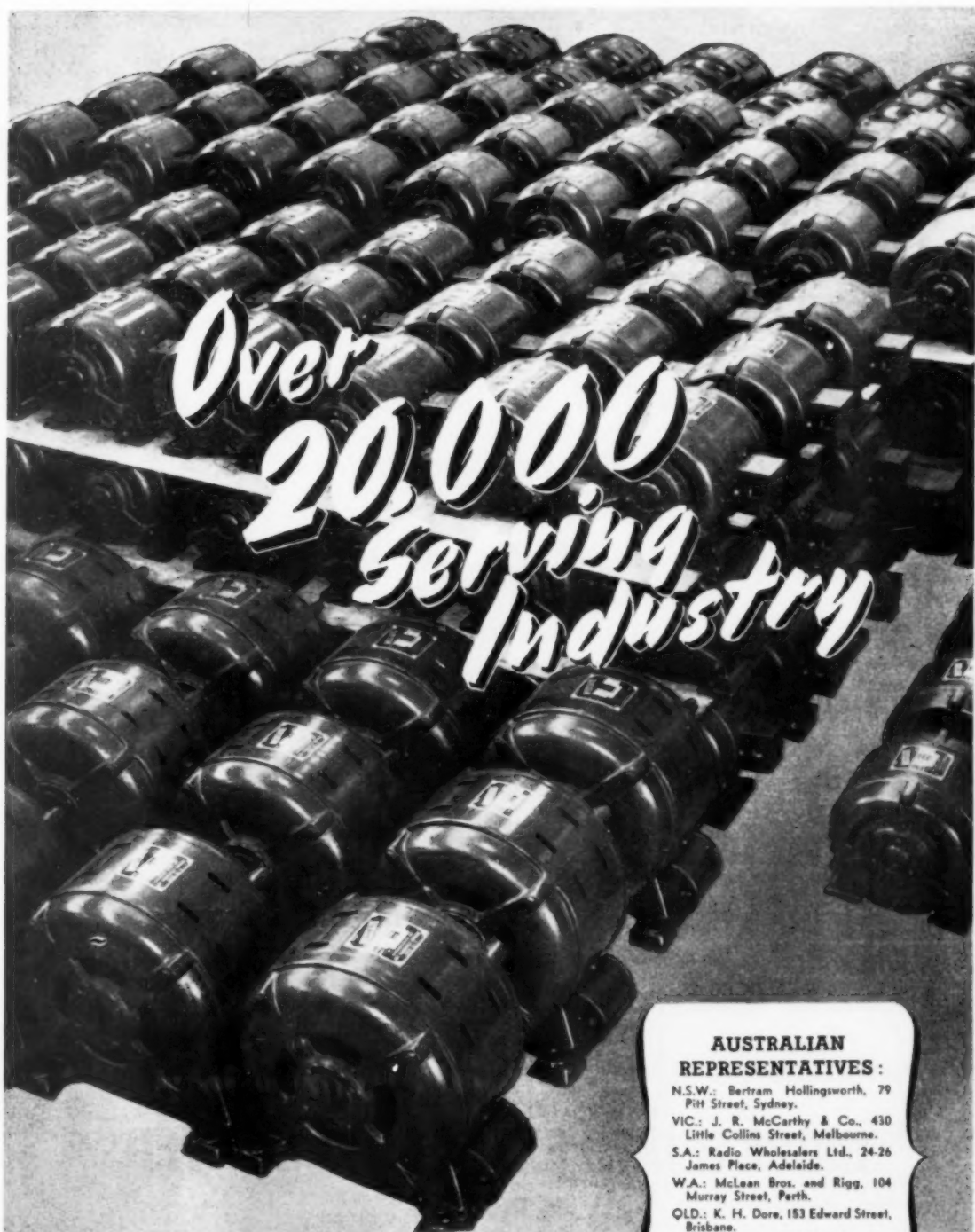
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[Page 227 JUNE 15, 1950]



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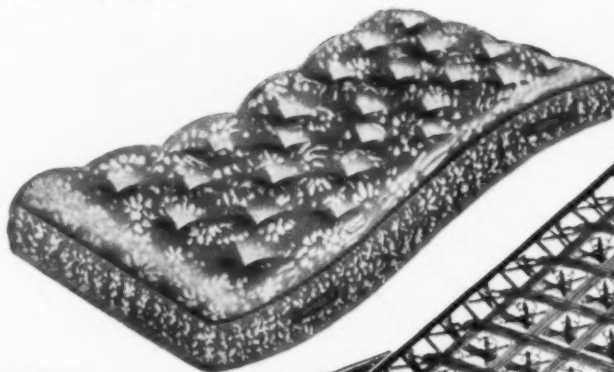




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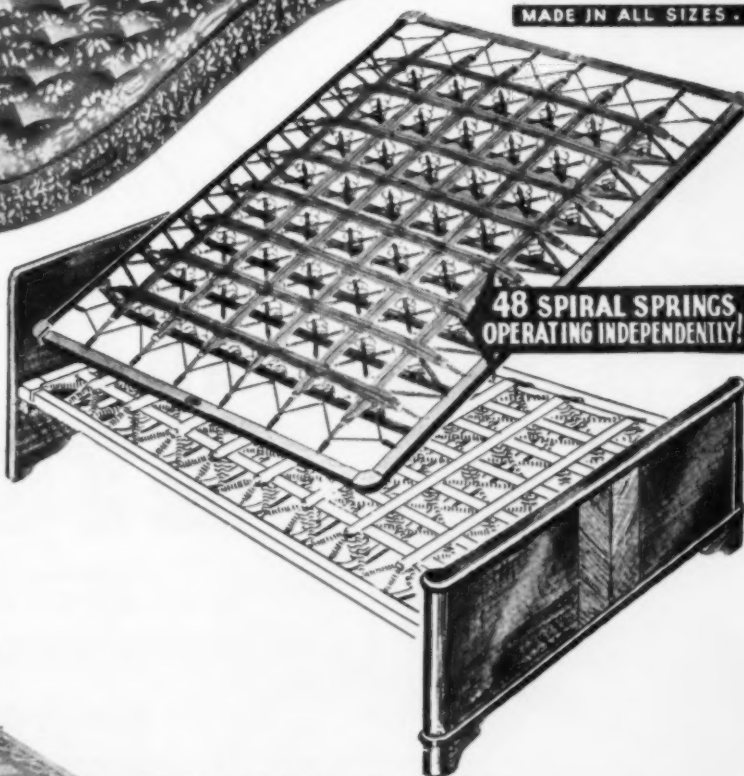
## *"Nights-Ease"*



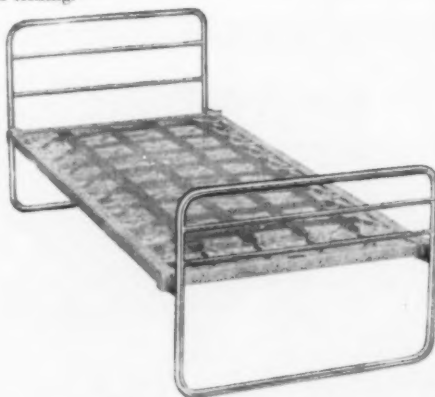
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At left: One of many BENZINE TANK WAGONS constructed by HUME STEEL Ltd. for the CEYLON Railways.



Also for the CEYLON Railways, HUME STEEL undertook the production of a number of open wagons. A completed Wagon is shown below.



HUME STEEL serves the Mining Industry in many ways. Illustrated above—a Mining Cage.



Another Hume achievement—a STEAM DIGESTER.



HUME STEEL has produced much equipment for Canneries, Factories, etc. Illustrated at left are two STEAM COOKERS built for a local concern.



Another example of HUME Service to the Mining Industry—an Ore Truck. Hundreds of such Trucks are in daily use throughout the Goldfields.

*Recent Steel Fabrications*  
by

**HUME  
STEEL**

*Ltd*

SUBIACO, PERTH, W.A.

**HUME STEEL LTD. SUBIACO, PERTH, WESTERN AUSTRALIA**



## Railway rolling-stock

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## Automatic Welding

The centre illustration is a view taken in the TOMLINSON Railway Wagon Shop, and shows the Automatic Arc Welding Head which is installed on the large, fully adjustable machine of our own manufacture to suit the wide range of work carried out in this section. This equipment, as well as speeding up production, ensures sound welds to a specification, which are necessary on all boilers, pressure vessels and parts subjected to high stress, giving a weld of maximum penetration and of excellent appearance.

## Industrial Radiology

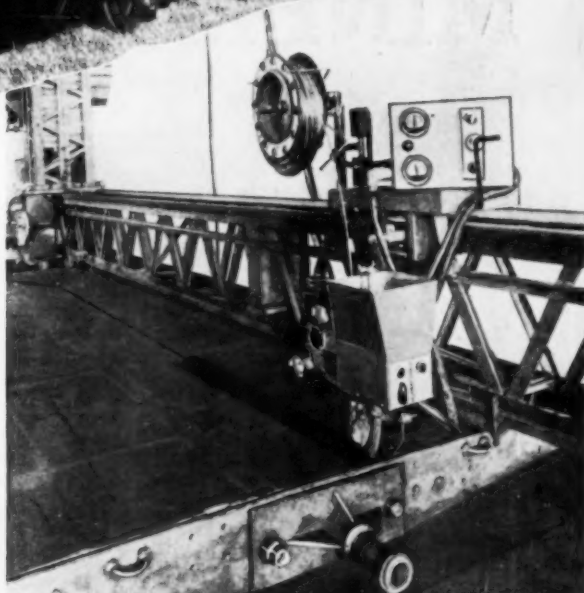
The highly revealing, non-destructive nature of X-Ray is harnessed for the service of Industry in the 250,000-Volt Unit illustrated at work in the TOMLINSON Factory. This machine is capable of penetrating up to 3 in. thickness in steel or cast iron.

Radiographic Examination furnishes the answer to many problems in the Foundry, Machine Shop, Fabricating Department and, in fact, wherever hidden flaws are feared or suspected. Internal Components of Sealed Assemblies are revealed for examination in a manner otherwise impossible.

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PTY. LTD.  
MANUFACTURING ENGINEERS  
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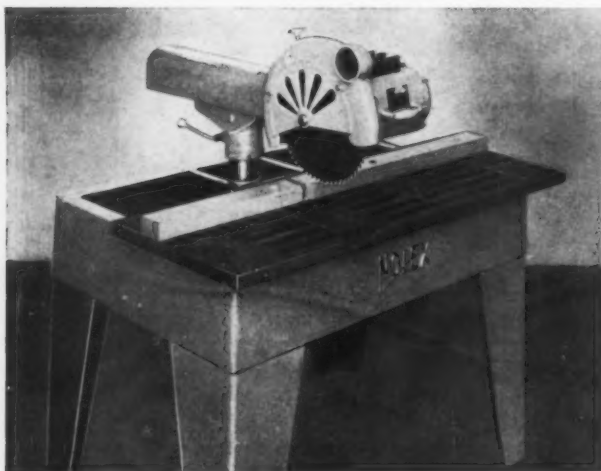
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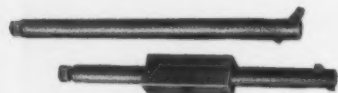
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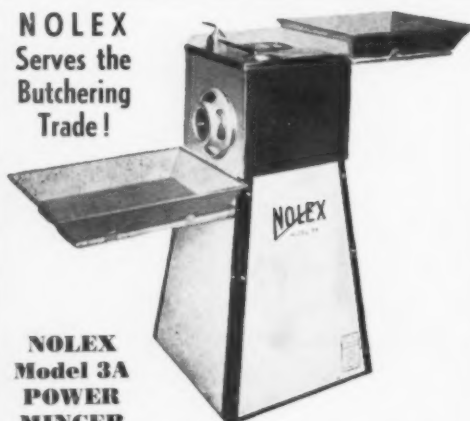
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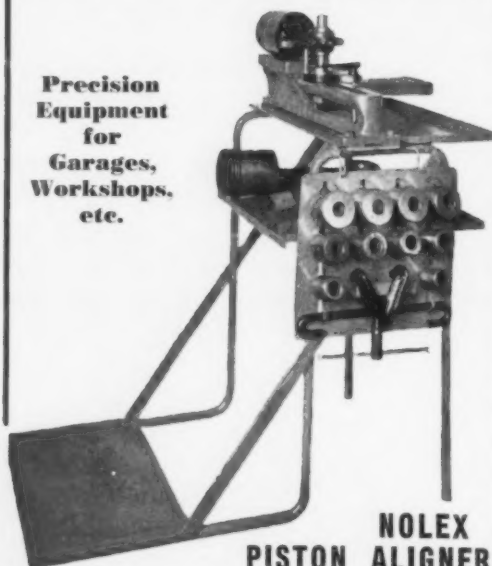
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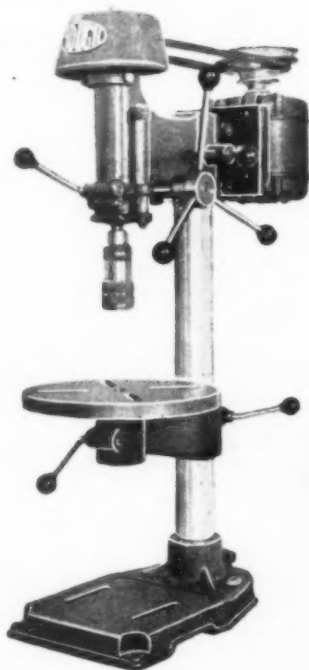




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SLOW SPEED ATTACHMENTS FOR DRILLS  
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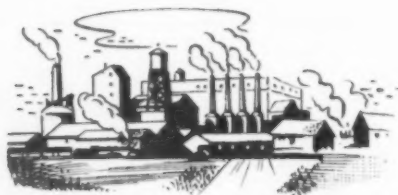
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# BE AUSTRALIAN—BUY AUSTRALIAN-MADE GOODS

(By F. W. Higgins, Australian Industries Protection League)



**EVERY** good Australian bears a share in the responsibility to increase production, and that responsibility was never greater than now. A country must utilise its own resources, convert its raw materials into manufactured goods, and so keep its people employed, or it cannot hope to achieve a balance in its economic affairs, realise its national aspirations, or maintain a reasonable contentment among its people.

The progress of a nation centres round its production and its capacity to produce. Security and development are closely related, and development will enable Australia to bear a greater share of the British Commonwealth's obligations.

Great Britain, with a far greater population than pre-war, with much of her overseas income dissipated, and with less resources at her disposal, is no longer in a position to maintain all her people at home. Australia can help by taking some of her surplus population, by producing more of the goods Great Britain requires, and by taking a larger share of the mutual burden of defence.

**ONLY** through developing our manufacturing industries can Australia attract and accelerate the absorption into our economy of the new additions to our working population. Primary industries are not capable of providing for a major increase in population. The stupendous efforts to settle soldiers on the land have resulted in placing only a comparatively small number. Even then it has involved displacement of some existing producers by resuming their land more or less by compulsion. On the other hand, the opportunity for expansion of manufacturing and its attendant activities is at present almost without limit.

The steady growth of the industries engaged in the production of raw materials has paved the way for a vast network of other manufacturing industries which derive impetus from the availability of ample material supplies. With the establishment of each efficient industry, advantages accrue to other subsidiary or dependent industries, and to the suppliers of raw materials, the makers of component parts, and the users of the finished products.

Industry is maintained at satisfactory levels by the steady demand for its products. Though experience has shown that the export market is very valuable, the home market is the most reliable. It is the home market that creates by far the greatest amount of employment and promotes internal stability.

Demand is made up of a great number of individual purchases. Each purchase of an Australian article plays a part in the huge chain of replacement transactions leading from retail stores back to the factories. In the establishment, enlargement, and running of factories, vast opportunities for employment are offered. There is the need for capi-

tal, use of land or other agents to secure sites, the work of surveying, legal transfers, the drawing of plans by architects and the submission of tenders by builders. Bricks, cement, sand, timber, tiles, iron, spouting and other building materials are required. Labourers, bricklayers, carpenters, plumbers, painters and various other tradesmen are needed. Machinery and plant must be obtained, a good measure of which comes from Australian suppliers. Staffs and operatives must be engaged, and it is here that many openings are afforded for technically trained new Australians.

Houses must be built to accommodate the staffs. Shops must be provided to supply their wants. Then there are all the additional requirements to be considered, and the employment given in providing them. Raw materials, packing, boxes, paper, twine are needed. The services of accountants and auditors, banking facilities, transport, municipal increases of property value, all these and more are involved. The developments which are influenced by the sustained purchasing of Australian goods are cumulative and endless, and add strength to the industrial structure on which our national safety and standard of living are based.

Every kind of occupation is made available, directly or indirectly, by the development of manufacturing, thus providing opportunities for congenial and profitable employment under good conditions for the sons and daughters of old and new Australians alike.

By effective use of tariff measures, coupled with the enterprise of Australian manufacturers and the skill of Australian workmen, we have already built up a wide range of products of which we are justly proud.

Australian manufacturers rose to the occa-

sion presented during the war, and the post-war periods, and extended their activities. Any check to Australia's development at this stage must be avoided. Many of the natural resources of this country have as yet hardly been touched. Long range plans and plans which will bear results in the near future have been initiated for the mining of greater quantities of black coal, and for the vastly increased use of brown coal for fuel and as a source of power. A start has been made on extensive hydro-electric schemes which will utilise for irrigation and power an increasing quantity of water from rivers hitherto allowed to run to waste.

We have our own special problems and have set ourselves the task of upholding in this part of the world certain principles and standards in which the rest of the world is not interested to the same extent or in the same way. The difficulties which have arisen in Thailand, Malaya, Indo-China, and South Africa on account of very large numbers of aliens in those territories, reflects the wisdom of the firm Australian policy on this matter. However, the Australian policy has never been racial, it has been designed to protect our standards of living.

There is no doubt that our manufacturing industries can be soundly advanced, and the further they progress the more useful we will be as an aid to other democracies whose destinies are likely to be linked with ours in the years ahead.

To keep our industries in operation to employ our whole population, including all the newcomers, we must cultivate the Australian outlook and sentiment. Ask for Australian-made articles. Show a strong interest in local productions. Acquire the habit. It is easy and it is a certain way to make a contribution to the welfare and progress of Australia.

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Is Published Every Saturday by The Manufacturer Publishing Co. Pty. Ltd.

Head Office: 16 BOND ST., SYDNEY, N.S.W. Postal Address: Box 1687, G.P.O. 'Phone: BU3493 Cable Address: "Manpubco."  
Branches at 197 King Street, Melbourne; 116 Currie Street, Adelaide; Eagle Street, Brisbane; and Beaufort Street, Perth.

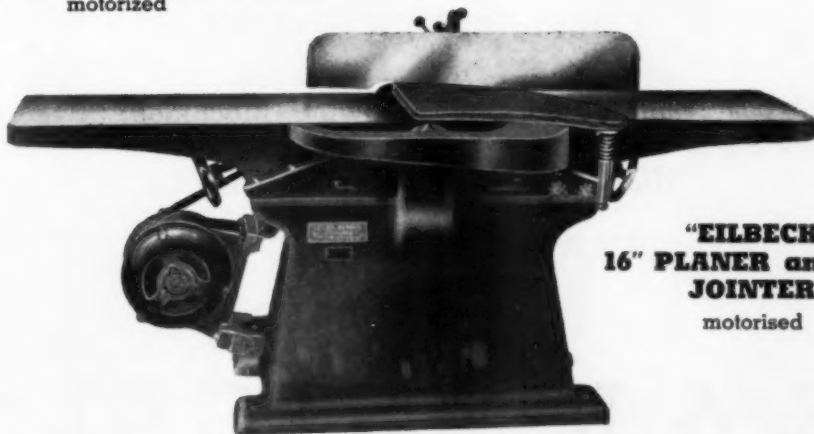
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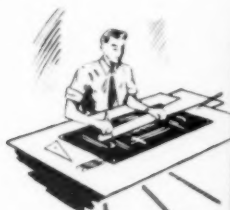


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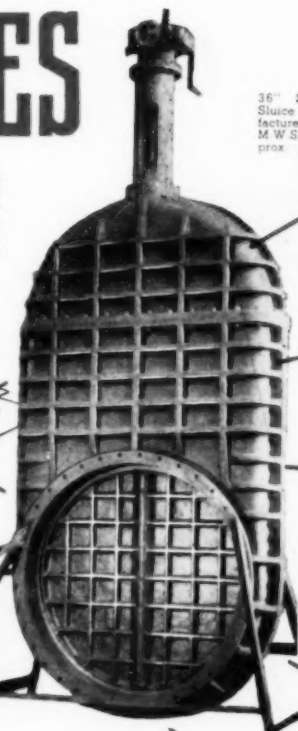


## VALVES

Morison & Bearby specialise in the design and construction of Industrial and Marine Valves to any required specification. Illustrated on this page are a number of valves made at our Newcastle plant.



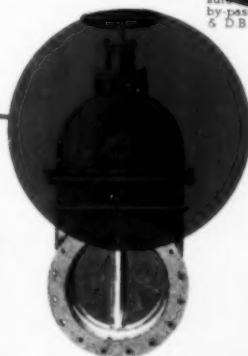
Valves similar to those illustrated have been delivered to: Metropolitan Water Board, Public Works Dept., Victorian State Electricity Commission, Hydro-Electric Installations and for Commonwealth and Overseas undertakings.



36" Split Disc Sluice Valve manufactured for M.W.S. & D.B. (approx. 8' high)



12" Stop Valve with by-pass lines for M.W.S. & D.B.



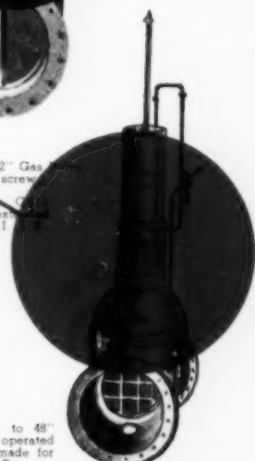
(Above) 74" Gate Valve designed and manufactured for State Electricity Commission, Victoria



(Left) 84" Butterfly Valve made for Hydro-Electric Commission, Tasmania. Electrically and hand operated.

(Above) 20-22" Gas Valve with hand screw

(Left) 24" Gas Valve with hand screw for A.I. Port Kembla



(Right) 36" to 48" hydraulically operated Stop Valve made for M.W.S. & D.B.

# MORISON & BEARBY LTD

Engineers — Newcastle, Australia



# ROTO-CLONE

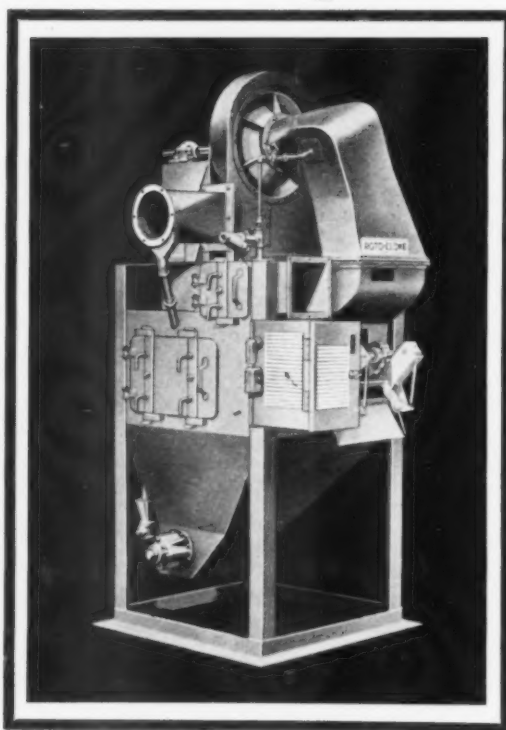
## DUST CONTROL

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The Type W ROTO-CLONE combines the dual functions of exhauster and dust separator embodies the principle of dynamic precipitation. A distinguishing feature is the ingenious addition of water sprays which extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles.

The Type W ROTO-CLONE has the performance characteristics of a forward curved blade fan and the operating range of a medium pressure exhauster. The relation of pressure, air volume and horsepower follow the standard laws of fan performance.



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## *Leaders in the field of*

### **METAL MELTING & HEAT TREATMENT EQUIPMENT .....**

Close association with two world-famous American manufacturers—LINDBERG ENGINEERING COMPANY of CHICAGO, ILLINOIS, and AJAX ELECTROTHERMIC CORPORATION of TRENTON, N.J. — places ALLMET INDUSTRIES PTY. LTD. in an ideal position to furnish all Australian requirements of LOW FREQUENCY INDUCTION FURNACES, HEAT TREATMENT FURNACES, also HIGH FREQUENCY INDUCTION MELTING and HEAT TREATMENT EQUIPMENT. Operating either as manufacturers under licence or as direct American factory representatives, ALLMET INDUSTRIES — widely experienced in the manufacture and installation of metal melting furnaces — are fully equipped to discuss with the Australian foundry and engineering industries their metal melting and heat treatment problems and to install the appropriate equipment designed by LINDBERG or AJAX.

#### **ALLMET-LINDBERG DOUBLE-CHAMBER LOW FREQUENCY INDUCTION FURNACES**

Manufactured under licence in Australia by ALLMET INDUSTRIES PTY. LTD., the ALLMET-LINDBERG Double Chamber Low Frequency Induction Furnace enables continuous pouring from the discharge chamber, ensuring speed, economy and greater output. Other advantages are:— precise automatic temperature control, long lasting and easily replaced cast lining, cleaner molten metal and cooler operation.

#### **LINDBERG-FISHER HEAT TREATMENT FURNACES**

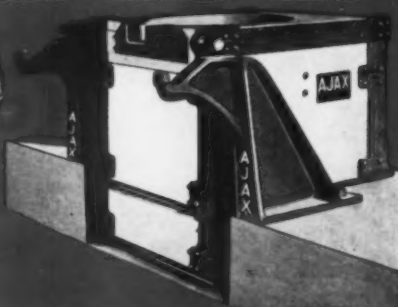
A comprehensive range of electrically operated heat treatment furnaces is available including Box Type for low-cost tempering for the tool room, Hydriding Furnaces for hardening high speed steel, and the famous Cyclone Tempering Furnaces. The range also covers Oil and Gas-fired Metal Melting and Heat Treatment Furnaces, together with oil burning equipment. These famous LINDBERG-designed and ALLMET-constructed products are available to Australian industry from ALLMET INDUSTRIES PTY. LTD., manufacturing under licence to LINDBERG ENGINEERING COMPANY of CHICAGO.

#### **AJAX-NORTHROP HIGH FREQUENCY INDUCTION MELTING AND HEAT TREATMENT EQUIPMENT**

The world-famed range of Ajax-Northrup High Frequency Melting and Heat Treatment equipment covers every need in this field. Generator and Converter type Melting and Heating Furnaces are available in all sizes. Allmet Industries Pty. Ltd. are direct factory representatives. Send your enquiries and the appropriate Ajax-Northrup descriptive bulletin will be forwarded.



**ALLMET-LINDBERG DOUBLE-CHAMBER LOW FREQUENCY INDUCTION FURNACE**



**AJAX-NORTHROP HIGH FREQUENCY STEEL MELTING FURNACE**

#### **ALLMET FOUNDRY FLUXES**

Allmet metallurgists have produced a comprehensive range of fluxes for all non-ferrous foundry purposes. Allmet Foundry Fluxes are used extensively throughout Australia, India, the near and far East.

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#### **ALLMET POLISHING COMPOUNDS**



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MAR 1953





Mr. R. K. Treloar, Managing Director,  
Allmet Industries Pty. Ltd.

## ALLMET INDUSTRIES EXPANDING FACILITIES FOR GREATER PRODUCTION OF METAL MELTING & HEAT TREATMENT EQUIPMENT

**A** new and commodious factory along modern lines and substantial extension of equipment are part of plans now being implemented by Allmet Industries Pty. Ltd. to ensure greater production. Allmet Industries are linked closely with Lindberg Engineering Company of Chicago, Illinois, and Ajax Electrothermic Corporation of Trenton, New Jersey, two concerns famous throughout the world.

A close association has existed for several years between Ajax Electrothermic Corporation and Allmet Industries Pty. Ltd., who are direct factory representatives in Australia and New Zealand for the former company.

Aware of the strong tendency in Australia towards wider use of modern equipment for metal melting and heat treatment, Mr. R. K. Treloar, Managing Director of Allmet Industries Pty. Ltd., who had been engaged for a number of years in the manufacture of electric furnaces, made a five months' visit last year to the United States and Canada.

During his stay he made an extensive survey of electric furnace manufacture and use in those countries. As a result, Mr. Treloar completed arrangements with the Lindberg Engineering Company of Chicago to manufacture the new and revolutionary double-chamber low frequency induction furnace pioneered by the Lindberg Company and now coming into wide use in U.S.A. and Canada. This furnace will be known in Australia as the Allmet-Lindberg Double-Chamber Low Frequency Induction Furnace

The great advantage of this type of furnace, which is literally two furnaces in one, is that it enables continuous pouring from the discharge chamber, even though cold metal has just been added to the charging chamber. This naturally ensures continuous casting because it eliminates time lags between charging and pouring.

Another significant advantage of double chamber construction is that dirt and impurities from scrap metal are confined to the charging chamber. Only clean metal, from beneath the surface, is allowed to pass to the pouring chamber. Again, the worry of channel blockages, so prevalent with orthodox types of furnace, is eliminated because of channel flushing, only possible with the double-chamber furnace. Costly delays are thus banished.

Under arrangements made with the Lindberg Engineering Company, Allmet Industries are also manufacturing under

licence the famous range of Lindberg-Fisher Heat Treatment Furnaces. These cover a very wide field of application and include, as well as electric types, oil and gas-fired melting and heat treatment furnaces, together with oil burning equipment.

Of outstanding interest in the Lindberg-Fisher Heat Treatment range is the Super Cyclone Furnace, embodying a new heating principle which utilizes 100% forced convection heating with temperatures to 1750° F and has equal heating and control accuracy within that range.

Other Lindberg-Fisher electric furnaces include Cyclone box types for accurate low-cost tempering for the tool room; Cyclone Lindberg Hydriding Furnaces for hardening high speed steel; Lindberg all-purpose Brazing Furnaces and continuous production Brazing Furnaces. Another interesting Lindberg type is the Hi-Life Pot Furnace, designed in both gas-fired and electrically operated models.

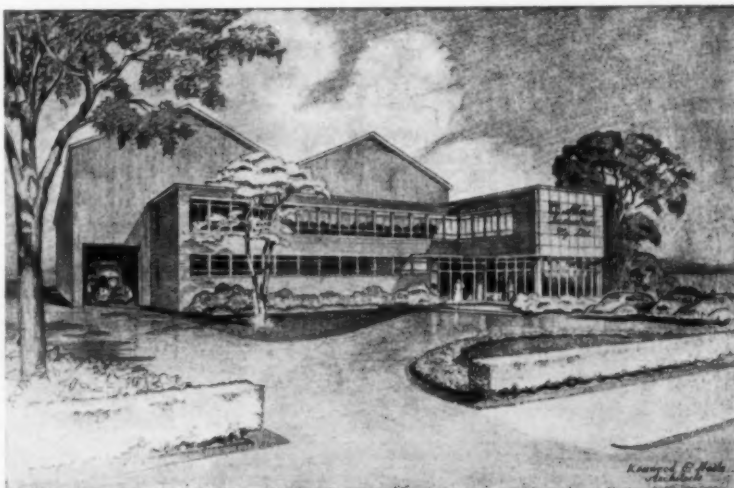
Lindberg Gas-Fired Furnaces include Cyclone Toolroom Box Type Furnaces; Cyc-

lone Production Box Type Furnaces and Cyclone Tempering Furnaces.

Fisher Gas or Oil Fired Furnaces include motorized tilting and hydraulic tilting Constant Arc Nose pouring Furnaces; Iron Pot Melting Furnaces for white metals; Aluminium Melting Furnaces; Magnesium Melting Holding and Alloying Furnaces; Fisher Monarch Simplex Metal Melting and Refining Furnaces.

The world famous Ajax-Northrup High Frequency Induction Melting and Heat Treatment Equipment for which Allmet Industries are direct factory representatives include Furnaces for Steel and non-ferrous melting, forging, upsetting, spinning annealing, hardening, etc. These furnaces are made in both motor generator and converter types.

It will thus be seen that, with this association of three concerns firmly established in the field of metal melting and heat treatment equipment, Allmet Industries Pty. Ltd. are splendidly situated to furnish any type of equipment within this sphere.



Architect's drawing of commodious new premises for Allmet Industries to be erected at Botany, N.S.W.



# CRYSTAL-LAPORTE PTY. LTD. CHEMICALS IN THE SERVICE OF **WHITENESS**

## FROM TEXTILES TO PROJECTILES

The demands made upon man's ingenuity, skill and patience in this last decade have probably been greater than ever before in history.

Both in the Medicinal and Scientific fields, dramatic response has been offered to the needs of the moment. The results achieved stand as a monument to the skill and unflagging efforts of those concerned.

**N**EW developments have raised new problems and notable among the scientific developments of the day has been the introduction of a long range missile—the rocket projectile, which itself presented a great problem—the best means of propulsion. One of the answers to this problem was found in Hydrogen Peroxide, the strength of which needed to be nearly four times that of the standard commercial product.

A new product was born and a new name was found—High Test Peroxide with a strength of 90% wt/wt or 410 Volumes.

A new plant was recently installed by Crystal Laporte Pty. Ltd. for the manufacture of this High Test Peroxide. This product opens up a new avenue to the research chemist in that it makes available to him one of the most powerful oxidising agents known to science. It is hoped that experimental quantities can be made available to interested parties in the very near future.

Extensive alterations have taken place during the past year to the main plant at Botany for the production of standard Hydrogen Peroxide 30% by Volume, commonly described as 100 Volumes. The capacity is now sufficient to meet all known Australian requirements both for industrial and medicinal purposes.

The range of peroxygen products produced by the Company is being extended in 1950 by the completion of a plant for the manufacture of

Sodium Perborate—Minimum 10% Active Oxygen. This is a new development for Australian industry as Sodium Perborate has not hitherto been manufactured in this country. This product has a wide range of uses in the soap and textile industries, which, together with its oxidising properties, give it a prominent place on the list of commercial chemicals.

Urea Hydrogen Peroxide, which has also gained prominence lately as an ingredient of hair blonding emulsions and general bactericide, is also being manufactured at this factory.

Not the least important of the manufactures of Crystal Laporte Pty. Ltd. are their detergents for the Dry Cleaning, Laundry and Textile industries, one of which—Cleonor—is known to these trades.

Further plans are in hand for extensions to the factory for the manufacture of detergents, and these should be well under way early in the new year. Crystal Laporte Pty. Ltd. are also sole agents for the Laporte group, comprising the following companies:—

Laporte Chemicals Ltd., Luton, England.

National Titanium Pigments Ltd., Luton, England.

John Nicholson & Sons Ltd., Leeds, England.

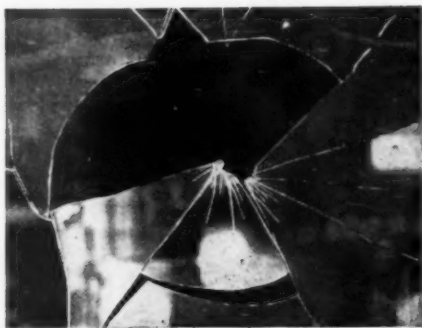
These developments enable the Company to retain an eminent position in the rapidly growing chemical industry of Australia, and it is to be expected that further extensions will proceed at an early date.



FACTORY OF CRYSTAL LAPORTE PTY. LTD., BOTANY, SYDNEY.

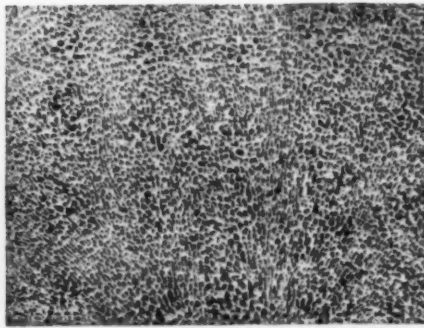


# Which is the safer?



THIS ORDINARY GLASS,  
which breaks into dangerous,  
jagged, dagger-like pieces?

or



This special glass, which possesses high resistance  
to impact and thermal shock and which, when broken,  
disintegrates into small fragments with harmless  
edges?

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Thick "ARMOURPLATE" for Port Holes in  
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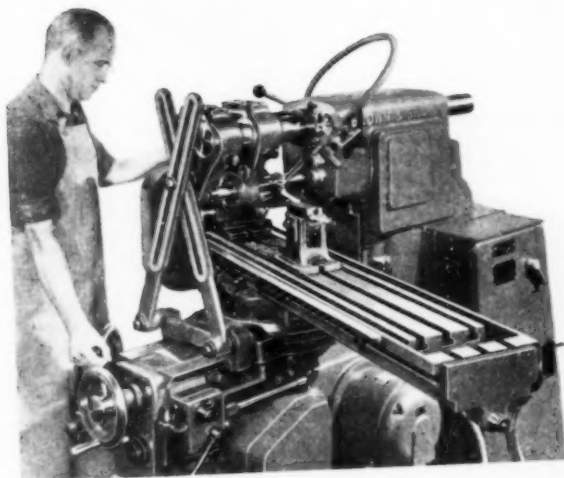


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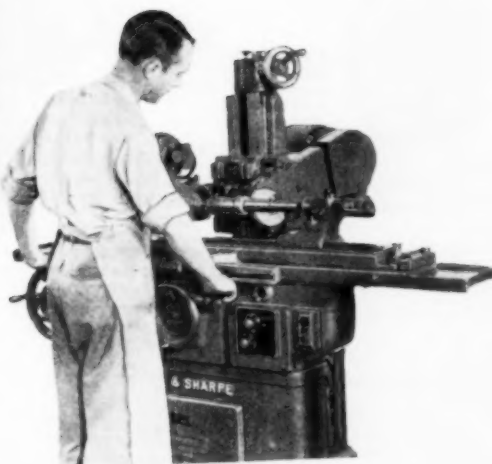
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- Modern Design



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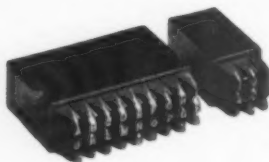
2in. Heavy Type Holder of greater capacity for larger type.

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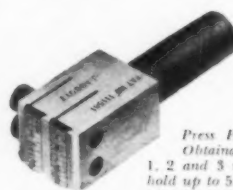
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# Is The Cost Accountant Necessary In Successful Production ?

By W. D. Scott, President of The Australian Institute of Cost Accountants.

THIS is the type of question which cannot be answered with a simple "yes" or "no." The answer depends upon a number of factors, such as the type and size of the organisation, the complexity of the business and of its products and the manufacturing and selling processes.

Even where the answer is an unqualified "yes," the necessity for the Cost Accountant in his relation to successful production is largely a matter of degree.

In the majority of cases, however, the Cost Accountant can play and is, in fact, playing, a most important part in the productive aspects of present-day manufacturing business.

MANAGEMENT'S job is to manage and, faced with the multitude of problems which exist in to-day's business economy is, in most cases, anxious to have all the assistance possible to make the job easier.

For the last decade, there has been, in many industries at least, a sellers' market, but times are gradually changing, and undoubtedly the struggle for profits will become more intense and difficult in the future than we have seen it in the immediate past.

For the first time in nearly a decade the word, "cost," is becoming an important word in the businessman's vocabulary. It is true that there has been a limited significance in the word in a price control economy, but with strongly competitive conditions on the horizon, the word takes on a newer and fuller significance.

The complexity of business to-day adds to the worries of the business man. As indicated earlier, this means, in the first place, that he requires all the help possible and, secondly, that time is his most valuable asset.

Particularly because of this latter factor, there has grown an increased attention upon the advisability of setting a target and measuring the degree of success or failure in reaching that target. The technique in cost accounting introduced two or three decades ago and now universally accepted under the title of "Standard Costs," is particularly applicable to this type of thinking on the part of management. This is true in the profit field, in selling, in production and, indeed, in most spheres of business influence.

The Cost Accountant, therefore, has developed a technique of budgetary control which sets up budgeted targets, in the preparation of which a great deal of initial thought can be directed towards obtaining the best results possible. Out of these budgets, or co-incidental with them, comes the development of standard costs. These involve the preparation of cost figures relating to the quantity and value of material and of labour and expense involved in the manufacture of each product under somewhat ideal or expected conditions.

With these standards the actual results realised are compared, and the comparison is made not only in relation to total cost, but can be sub-divided into each element, into the material cost, the labour and expense costs. Nor is that all, for the comparison can be taken much further. It can be made in relation not only to the quantity of material involved, but also to the price of such material—not only to the number of hours spent on the job, but also to the rates of pay paid to the people on the job—not only to the amount of the expense involved, but also as to whether the expenses were higher or lower than was expected.

In such cases, therefore, the Cost Accountant is able to present figures to the Production Manager in terms such as these: "Well, Mr. Production Manager, after joint consultation, you planned for this factory to attempt to make 100 units. Actually, it has only produced 95. You will remember, also, that we anticipated that the total cost of each product would be £50, of which £10 was for materials, £20 for labour and £20 for expense. We now have the actual costs of producing these 95 products, and if you will look at these figures, you will see that we used too much material although, fortunately, we bought most of it a little better than we anticipated. Our men have taken somewhat longer on the jobs than we had anticipated and, furthermore, whereas we intended to use a proportion of apprentices, you will remember that these proved impracticable and we had to pay full rates. Insofar as our expense is concerned, there were three items which cost us more than we anticipated, and on top of that we only had 95 of these products to spread over all our expenses instead of 100 and, therefore, our expense cost in the product is also up. Now, if you would like to know just how much is involved in each case, here are the figures."

To the small business this may be as far as it is necessary to go, but to the larger one the information available may be insufficient for control purposes. In any case, cost accounting is constantly improving its techniques, just as is everything else. So the Cost Accountant has proceeded further than this, and it is a simple matter for him to say that, in connection with the use of materials, Department A has done a good job and Department B, whilst falling down slightly, can be given a pass. Department C, however, requires attention because their excess material is 15 per cent. over what it was estimated it should be when preparing these standard costs. If the Production Manager should then ask what materials showed the main excess, the Cost Accountant should, in turn, be able to say that it was in materials 128, 149 and 232. This procedure can be copied in regard to the price factor of materials as well as to both of the other elements—labour and expense.

Nor is this all; for the latest development in cost accounting, particularly in relation to its use as an aid to production, is the development of what may be called casual variations. It is one thing to know what is going wrong, but to a busy production executive it is immensely more helpful if the Cost Accountant can give an indication, firstly, of the location of the excesses; secondly, of the reason for the excesses and, thirdly, of the person responsible for the excesses. Not every organisation would require this and, particularly, because management is the control of people rather than the control of things, many pro-

duction executives prefer to ascertain these things for themselves. The complexities of modern business, however, mean that fewer and fewer executives have the time to do this, and rectification becomes possible quickly only when complete information is served to the executive and he is left to consider this primarily in terms of "What is the best way to remedy this?" and "How can I teach my people the importance of remedying it?"

This is a simple—perhaps an over-simplified—picture of part of the aid which the Cost Accountant can give. He can, however, help in a number of other directions. He can provide the Production Manager with statistical information regarding volumes and values of production and comparison with previous periods; with the trend of man-hour output; with idle machine times and the reasons for their occurrence; with the costs of the various services auxiliary to production; with the cost of repairs and maintenance upon machines; with the volume and value of spoilage and scrap and the efficiency rates of operators; with the cost of materials handling and the proportion of direct and indirect labour.

If these are not sufficient to convince the sceptic of the aid which the Cost Accountant can give towards increased production, let us consider this simple case. The standard cost of a product when taken out for the first time (though the product had been in operation for some considerable period) showed, to the surprise of management that it was actually being sold at a loss. Its selling price was 9/-—its production cost 10/- . The Cost Accountant was worried about it and went to management. Together they arranged for the methods man to have a look at the problem and he, after studying the various cost elements provided by the Cost Accountant, went to work. The resultant new product was a better one, and its cost was much cheaper. The guarantee for the new product was considerably increased, yet every product leaving the factory was showing a 3/- profit instead of 1/- loss. The result was an increase of £20,000 in net profit over the year.

I agree that that was not the Cost Accountant's doing. Yet without the original standard cost the practice of previous years would simply have continued. It was the partnership between the Cost Accountant and the methods man which brought about the result. This new type of partnership promises great things for Australian industry.

Is the Cost Accountant, working along these lines, really necessary for successful production? Each one can supply his own answer, but for my part, though I plead guilty to being biased, I feel constrained to say that nobody who has seen so many examples of how the Cost Accountant can aid production, could have any doubts about the way in which the question should be answered.



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## OFFICE EQUIPMENT

### GUMMED TAPE and STAY PAPERS

THE industrialist of to-day has to see to it that every department of his plant or workshop is characterised by maximum efficiency. It will avail him little to have the production end managed capably unless the office is also run along the most modern lines.

Effective office administration presupposes, first, the availability of the newest and best aids that have been devised to ensure that correspondence shall go forward in such manner as to suggest it comes from a well-run enterprise; second, that the office supplies in use shall be of superior and lasting quality; and third, that the office itself shall be equipped with the latest types of apparatus for speed, economy and efficiency.

THE office is the very heart of any manufacturing organism. It is imperatively necessary, therefore, that there should flow from it a life-giving stream of ideas, of plans, and of production programmes that suggest a busy well-organised undertaking.

In order that office executives may discharge with capacity and skill the many varied and responsible tasks allotted to them, they must have at their disposal equipment and supplies calculated to help them in the attainment of this objective.

#### MODERN SUPPLIES READILY AVAILABLE.

Fortunately, the securing of the requisite supplies is to-day a relatively simple matter, there being available both office supplies and equipment that leave nothing to be desired in the matter of quality and dependability.

Take, for example, the wide range of general office supplies in regular production by

J. Mason and Son Pty. Ltd., a company which ranks high in its special field. This is evident from the fact that it operates two modern factories in New South Wales, one at Rose Bay and the other at Mascot. Both of these are equipped with up-to-date plant for the manufacture of the many excellent lines bearing the "Mason" brand.

#### GENERAL OFFICE ACCESSORIES.

Figuring prominently in the "Mason" range are their gummed tapes and stay papers, both of which are proving themselves valuable time and money savers in offices, in warehouses, in retail stores, and in private homes.

Another "Mason" line whose use makes for high efficiency is their duplicating stencils. These are in eager demand because of the clarity of the copies made available.

The "Mason" stamp pad also continues to give an excellent account of itself. This is because the ink used in its manufacture is of the highest quality, thereby guaranteeing a

sharp-cut reproduction of the individual stamp.

#### "MASON" FAST-COLOUR RIBBONS.

The organisation also specialises in the manufacture of ribbons for both typewriters and adding machines. These conform to the highest standards, the ink being guaranteed absolutely colour-fast under all operating conditions. The method of production of their two-colour ribbon, moreover, is such that under no circumstances is a running of the colours possible.

"Mason" carbon paper is also of excellent quality. By reason of this fact not only are clear-cut copies guaranteed; in addition, each sheet may be used for a much longer period than normally is the case.

The "Mason" brand on office supplies and accessories means, in consequence, easily-read typewritten matter; sharp carbon copies; clear-cut stencils; and legible stamps—in short, dependable and efficient office requisites for every conceivable occasion.

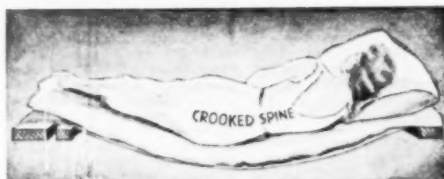




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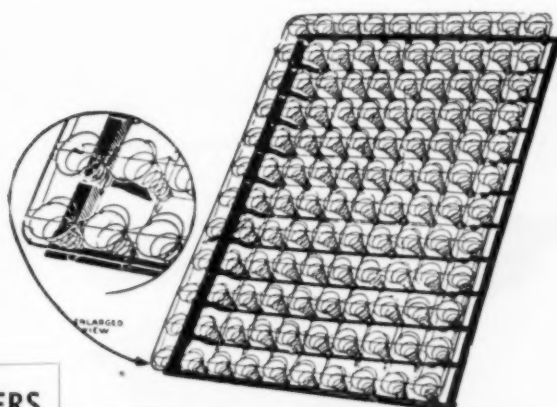
### F.R.S. "Spiral Spring" Mattress

Design No. 1000

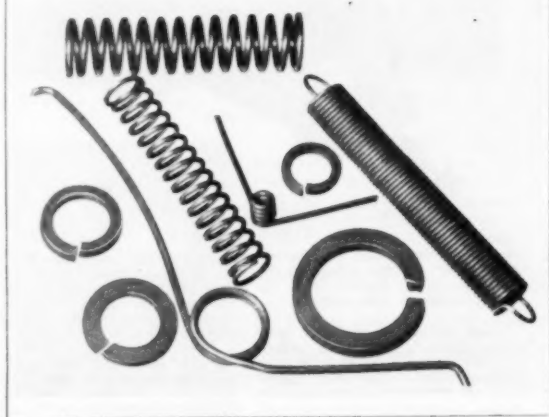
has 12 cross bars attached to steel angle irons; 120 highly tempered springs are attached to the cross bars. Every spiral spring is interlocked with "F.R.S." Patent Interlocking Wire, No. 20802, to keep each spring in perfect position.

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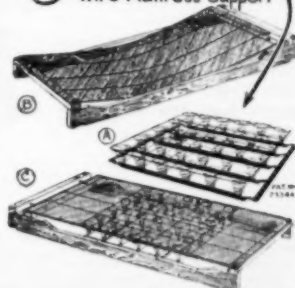


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# "A HANDFUL OF ENERGY"

## Desoutter Pneumatic and Electric Tools

INITIALLY designed and manufactured by Desoutter Bros. Ltd., to solve production problems in their own factory at The Hyde, Hendon, London, Desoutter Portable Tools proved too efficient and revolutionary to remain a trade secret for very long.

First produced in 1919, their prototype—the first portable pneumatic drill made small enough and light enough for one-handed operation—became the forerunner of approximately 100 models of pneumatic and electric portable tools covering almost every industry and capable of being fitted with special attachments for practically every conceivable use.

WITH modern streamlined aircraft production presenting so many awkward assembly problems, it is no coincidence, therefore, that the change-over in aircraft design from wood to metal construction has largely paralleled the development of Desoutter Portable Tools.

Packing the greatest possible amount of power and efficiency into the smallest and most handy form, they have become absolutely essential for drilling holes in "hard to get at" places, or for tightening nuts and bolts to their correct tension.

On assembly lines, too, almost

considered, and reference to the accompanying illustration will give some idea of their snug "moulded to the hand" construction. None of this range of Electric Drill Gun types exceed 2½ lbs. in weight.

Of the Desoutter Pneumatic Tools, the lightest is the "M60" Miniature Screwdriver, weighing only 8 ozs. It is a compact little instrument which runs at 14,000 r.p.m., bringing the benefits of power assembly to operations hitherto considered too small or delicate for such methods.

The industries whose problems

Spindle and other rotating parts are of Chrome Molybdenum Steel, hardened and tempered.

### WIDESPREAD USE.

Once the idea of portable tools was established by Desoutter Bros. Ltd., they were frequently called upon to provide the answer to the heart cries of Production Engineers for any number of special adaptations to simplify or speed up drilling, screwing or cutting in awkward positions.

A quick glance along assembly lines all over the world reveals the successful application of these tools to an astonishing variety of uses. In the aircraft construction industry more Desoutter tools are used, it is claimed by the makers, than all other makes combined, while their extensive use for maintenance of civil and military aircraft in this country has proved their efficiency beyond all shadow of doubt. Even in U.S.A. they are

to do the work of ten men with hand operated tools, interesting calculations are open to be made as to the amount of labour saved by—for instance—a multi-drill set-up using nine high speed drills in a row for drilling wing spars, such as was devised by the Bristol Aircraft Co. Ltd. (builders of the recently launched giant Brabazon).

Another operation which is carried out with the utmost speed and efficiency by Desoutter tools is the removal of flash from plastic moulding. In the accompanying illustration this is being done with the aid of a rose bit in a Mighty Atom Corner Drill.

Among the many firms which use Desoutter tools extensively to speed up and simplify production is Joseph Lucas Ltd., of Birmingham, England who have devised some remarkable applications for the high speed assembly of motor electrical equipment.

These range from a set-up of six



Electric Drill — Gun Type. Obtainable in capacities from 3/16" to 5/16", in speeds from 450 to 5,000 r.p.m.



Model "O" Grinder. Speed, 70,000 r.p.m. Weight, 12½ oz.

every type of production is catered for by one or other of the machines available. As most of them have been designed for "one-handed" operation, weight and balance have been carefully con-

the Miniature Screwdriver is mainly designed to solve include clockmaking, instrument making, radio, radar and telephone assembly—as well as the manufacture of small electrical appliances, calculating machines, typewriters, etc.

Its lightness and simplicity of construction make it particularly adaptable for use by female assemblers or unskilled process workers, a notable feature in these days of heavy staff turnover.

Another small tool, which finds instant popularity among workers and factory owners alike, is the model "O" Pneumatic Grinder, made especially for Die Sinkers and Tool Makers. Designed to give years of service with normal maintenance, the Rotor, Wheel

used on a wide scale in spite of the higher prices compared to local products—necessitated by import duties in that country.

Some tools, of course, have many applications—while others may be regarded as strictly one-purpose tools. The twin operations of drilling and tapping are shown below where two awkward jobs on textile machinery are performed easily with the aid of Desoutter Tools.

Desoutter tools may be used singly by hand or in fixed mountings—or mounted in set-ups of two, three or four, or even in batteries of six or more.

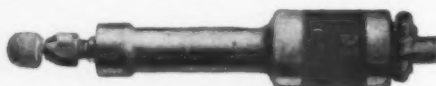
As it is claimed that the use of one power tool enables the user

pneumatic nut runners for the simultaneous tightening of six nuts on an electric horn to the use of a pneumatic motor as a cross milling fixture in a C.V.A. automatic machine.

But it isn't only on assembly lines that users have shown their



Miniature Automatic Screw-driver. Type "M60." Weight, 8 ozs. Speed, 14,000 r.p.m. In the operation shown here, screws are inserted at the speed of 1,500 per hour.



Type "R11" Pneumatic Grinder. Collet type. Weight, 2 lb. Speed, 18/20,000 r.p.m.



Tapping ½" holes with a type R16/40 Tapper at Courtaulds Ltd., Accrington, Lancashire.



Drilling with Type "R3/21" Drill.

ingenuity in employing Desoutter equipment. These light, easily handled tools which seem to be able to run almost indefinitely with a very minimum of maintenance have found wide usage in every type of factory and workshop from enterprises on a national scale to the "one-man" garage.

Indeed, it can be claimed that the use of Desoutter portable power tool equipment, both elec-

tric and pneumatic, has been responsible during the last ten years for a very large proportion of the increase of production in so many factories throughout the world.

Used either for normal production and assembly operations on such standardised products as radio and telephone assembly, furniture and refrigerator cabinets, aircraft work, motor body building, etc.—or for the special applications where individual attachments have been devised—the result has always been a speeding up of work, and the freeing of staff from tedious unproductive and awkward manual labour.

Among the more specialised applications of Desoutter tools is the use of reversing type pneumatic tools fitted with special rubber cap attachments for unscrewing plastic mouldings from the hot platen.

Another is the removal of burrs from oilholes inside hollow crankshafts by a special long corner drill fitted with various burring cutters.



Removing flash from plastic telephone handsets with Desoutter Corner Drill.

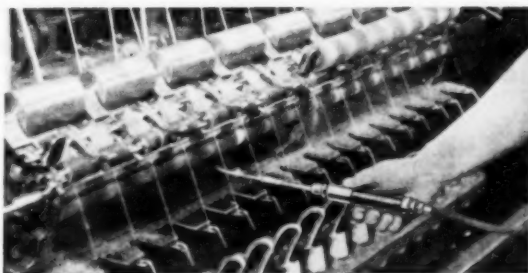


Driving home domed screws on panels of petrol pump with a Type "M17" Mighty Atom Screw-driver.

High speed toolroom grinders with special polishing buffs are even used for finishing acrylic resin artificial teeth, while a specially designed miniature pneumatic motor has made a most successful bone saw used in hospitals throughout the world.

It would be hard, however, to find a more enterprising example of the versatility of these tools than that in South Australia of filing the teeth of stud rams! This was done with a model "O" Pneumatic Grinder, which, weighing only 12 ozs., is almost small enough for ordinary dental use.

Another recent interesting application of a high speed miniature pneumatic tool applies to cotton

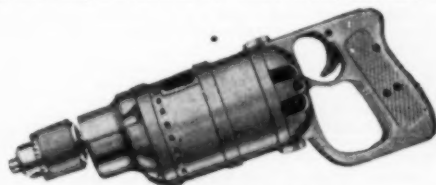


Type "M61" Roll Picker, designed for the easy and rapid cleaning of all types of spinning and roving frame rolls. Speed, 14,000 r.p.m. Weight, 8 ozs.

mills, where it is used as a cleaning device for roving frames. This tool is fitted with a long taper steel needle, and picks up fluff automatically at astonishing speed.

While these represent only a few of the many hundreds of dif-

Nor has the demand for Heavy Tools been neglected. The "Vidal" range of Electric Drills, built with sufficient power for the maximum penetration of which the modern twist drill is capable, are both low in weight and small in bulk, and suitable, therefore, for every



VIDAL TYPE ELECTRIC DRILL.

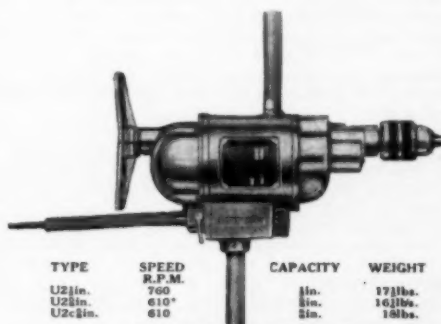
Type	Speed r.p.m.	Capacity	Weight
"D"	2,000	1in.	7lbs.
"E"	1,500	5/16in.	7 1/2lbs.
"F"	1,000	3/8in.	7 1/2lbs.

ferent applications of Desoutter fractional horsepower portable tools, they are sufficient to demonstrate the progressive policy of the firm in supplying unusual tools for special needs.

As further needs arise, no doubt, others will be designed—but it is difficult to imagine any operation which is not covered already by the enormous range of Desoutter portable tools.

type of engineering project.

These may be seen in operation on all major constructional jobs in Australia such as hydro-electric schemes and fabricated steel construction, as well as in shipyards and engineering shops—in short, anywhere where the drilling of metal, wood, masonry or concrete is necessary.



TYPE	SPEED R.P.M.	CAPACITY	WEIGHT
U2 1/2in.	760	1 1/2in.	17 1/2lbs.
U2 3/4in.	610*	1in.	16 1/2lbs.
U2 1in.	610	3/4in.	16lbs.

\* Fitted with Morse Taper Sockets.

VIDAL EXTRA HEAVY DUTY TYPE ELECTRIC DRILL.

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3 Elizabeth Street, Hobart

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168-174 Day Street, Sydney

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Now with this new Type MBC Spray Gun, DeVilbiss takes another impressive step forward and makes the most up-to-the-minute contribution to spray-finishing progress.

This new DeVilbiss Spray Gun has been designed especially for the application of the new synthetic materials. It sprays these new modern finishing materials with greater efficiency, producing higher quality finishes with less effort and at lower cost.

The type MBC is not only a new gun for use with new materials, but also is a better gun for the application of ordinary enamels, lacquers and paints.

Presenting many improvements in spray gun designs, this new gun retains and develops to still higher efficiency the basic DeVilbiss features which have been long tested and proved successful in many different industries and with many different painting and finishing materials. These patented and improved features include, of course, the removable spray head, ball and cone nozzle principle and graduated spray width adjustment.

Small or Large Stationary and Portable Equipments kept in stock for Immediate Delivery.

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The DeVilbiss system of painting and finishing makes possible the application of varnishes, enamels, first coats, lacquers; in fact, practically any kind of liquid finishing materials on wood and metal products by means of compressed air. It also has modernised the painting of buildings, ships and other large objects to a like extent, so that oil paints and enamels are now applied on them with air under pressure.

This system is the result of extensive painting, mechanical and manufacturing experience, and is practical and complete in every detail.

If interested, write for particulars and prices.

DEMONSTRATIONS ARRANGED.

## SHIPBUILDING

(Continued from page 97)

in the rack, the power to each of the four magnets being separately controlled so that one, two or more plates can be hoisted simultaneously.

Vessels are released from the slipway by four electric launching triggers when the launching lady presses the button at the bow. Each trigger is comprised of multiple levers where a 100-ton pressure from the ways is reduced to 18 lbs. on the solenoid.

Throughout the yard, rivets are heated in triple head electric rivet heaters. Coke fires are only in rare cases used for inaccessible corners of a ship.

Wood decks are now secured by electric welding steel studs through the drilled planks. This process meets with Lloyds' full approval, and has considerably lowered costs and speeded up work for the numerous fitting-out trades on the deckhead of the accommodation spaces below.

Steel bulkheads are now a feature of the accommodation. Furniture, cable trays, hardware and numerous other fittings are all secured by electrically-welded brass studs which are rapidly positioned with stud guns.

There are many interesting aspects in the construction of the B.H.P.'s own Yampi class ore steamers:—

Of the 4,600 tons of steel in the hull of this ship, 1,100 tons is of welded construction.

The huge bunker which can carry 1,800 tons of coal, is designed with a sloping bulkhead to be self-trimming, and all coal is mechanically handled into the boiler. It is fitted with a closed feed system, having double distillers.

The majority of the auxiliaries are electrically driven.

The latest navigation aids have been fitted, including gyroscope and a radar room has been provided for installation when opportune.

The vessel has three Babcock & Wilcox water tube boilers, supplying steam to three Parsons Marine Steam turbines, driving the shafting through a single reduction gearing. For the first vessel the shafting and stern tube were machined at Whyalla, whilst the turbines and gearing were imported. Turbines are now being manufactured, to Parsons design under licence, in the B.H.P.

organisation. Gearing is also under manufacture in the Eastern States, and meanwhile a large gear cutting shop is being erected at Whyalla to completely handle all this work in the future.

The new 10,000-ton vessels being planned by the B.H.P. will incorporate many of the latest developments in shipbuilding. Electric winches will be fitted, also patent rolling steel hatch covers. Tank tops and decks will be of flush construction, and considerable use will be made of welding. It is planned that these ships will have a normal cruising speed of 14 knots.

Australian yards generally are experiencing difficulties due to the vastness of this continent and its comparatively small population. This is particularly so at Whyalla where, in spite of their small labour force, they are carrying out the manufacture of considerably more fitting-out equipment within the yard than would be normal practice in the United Kingdom. However, the troubles encountered at the inception of the industry must lessen as shipbuilding grows and becomes firmly established, and builders look forward optimistically to the future as the population of Australia, with its natural growth, supplemented by planned migration, increases.

## FAN ENGINEERING

(Continued from page 112)

What is it, then, that air conditioning can do? Let us consider the human body, and see it as a power plant with a most exacting heat balance. To maintain this heat balance, the body is equipped with an intricate temperature control system, which, during good health, holds a precise temperature of 98.6 degrees Fahrenheit summer and winter. The individual does what he can to help, by wearing heavier clothing in winter to act as heat insulation, and during the summer, he lightens his clothing to reduce its heat insulating value.

Air conditioning can now be introduced and we walk into an air conditioned room, and before long we notice that the backs of our hands are drying and if we then change our wet clothing, we are soon completely comfortable. Why? Because we are now surrounded by an atmosphere cool enough and dry enough, not only to prevent the rise in temperature of the body, but also to absorb the heat and moisture being thrown off by the skin surfaces, and the more surface exposed the better.

To assist the body mechanism in this work of adjusting and balancing heat intake and output, central heating systems were developed, then mechanical ventilating systems, and then, finally, air conditioning systems.





"HYGIENIC" FOOD CONTAINERS are artistically printed and eliminate the cost of labelling.



## PACK HYGIENICALLY and REDUCE CONTAINER COSTS!

With the ever-increasing shortage of metals and the need for facilitating the problem of packaging, the demand for HYGIENIC CONTAINERS is growing steadily day by day.

Paper containers and cups are saving manufacturers substantial amounts each year in packaging and freight, and have many advantages over other methods of packing.

Everyday items such as jams, peanut butter, fruit spread, butter, ice cream, lard, cheese, honey, meat, fish pastes and cosmetics now reach the consumer in HYGIENIC CONTAINERS, and a skilled research staff is waiting to demonstrate applications for YOUR products.

## Hygienic Containers Pty. Ltd.

Gardeners Road, ALEXANDRIA, N.S.W.

Phone: MU 2281 (3 lines). Telegraphic Address: "HYGICON," SYDNEY

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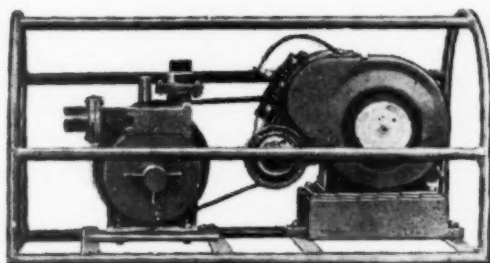
NEW ZEALAND: Foley Bros. (N.Z.), Ltd., Wellington

ASIA: P. E. Scrivener & Co., Ltd., Sydney

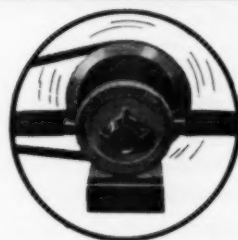
## For Economical Pumping—use the MARINO PUMPING UNIT

This Marino Pump can be used for fire-fighting, spraying weed killers—pumping any kind of liquid at all. The Unit incorporates the Dowling Rotary Pump—a positive, self-priming rotary pump built of gunmetal with a stainless steel shaft. Ideal for pumping liquids, such as salt and fresh water, petrol, crude oil, kerosene and lubricating fluids. Available with relief valve where varying outputs are required—such as small irrigation plots or fire-fighting methods. The Pump is extensively used for hormone and other low pressure spray work.

Available to the trade at maximum discount. Write for full details.



★ This Marino Flexivane Pump has already given the equivalent of well over 20 years of normal life under test.



## The MARINO FLEXIVANE PUMP

The Flexivane Pump on test at Marino Products ran continuously for 3,500 hours except for an inspection at 2,020 hours. Over the whole period the pump received no attention or lubrication—the bearings are patent water-lubricated. The only repair was at 2,020 hours, when the gland seal was replaced at a cost of 1/5d. The pump's performance has been outstanding the whole time.

### FOR ALL SMALL WATER PUMPING JOBS

The unique features of the Flexivane lie in the facts that the bearings are automatically lubricated by the water passing through—and that sand and grit have no effect on the working of the special Flexivane Blades. This self priming pump is low priced and inexpensive to run. It's just right for Engine Cooling and small water pumping jobs—for Marine and Industrial use. Write today for full details.

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- Mass production methods enable us to supply better boxes at bedrock prices, as our output exceeds 1,000,000 boxes per annum.

- We also manufacture special lines, such as factory storage racks, confectioners' trays, and platforms for lifting trucks.
- Timber in all sizes supplied to manufacturers at wholesale rates, for all packing purposes.

**SMITH BROTHERS PTY. LTD.,** Case Manufacturers, Timber Merchants & Fibre Carton Suppliers

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Telegraphic Address: "BOXSMITH," Sydney.

Established 1915.

Phones: MU 2241 (5 Lines).

### FORGING AHEAD

(Continued from page 220)

ing equipment. It is equally vital for wearing surfaces to withstand the abrasive action of direct contact with the earth sand, and dust particles which surround these machines during operation.

In the choice of forgings for these and other applications, it is kept in mind that strength is achieved not by sheer bulk of metal, but by using the best steel for the job, forged to give correct grain structure, and with critical control of heat treatment methods to ensure that maximum hardness is incorporated where this property is required.

#### FORGING TOLERANCES.

The A.F.E. organisation insists that there is a great future for the forging industry in this country. But while a wider use of forgings in Australian manufactures remains their major aim, they lose no opportunity to point out that sound development of the industry is largely dependent on the adoption of standard tolerances for drop forgings.

The selection of tolerances for a part is a major factor in determining forging cost.

Because dies wear with use there is some variation in parts as a result. Other variations may occur because of mismatch of the dies, variations in temperature of the material, or other causes.

In some cases, liberal tolerances may be acceptable and will substantially increase die life, may reduce the number of operations and

the percentage of rejects. All of these will reduce the forging cost. In other cases close tolerances, while increasing forging cost, will reduce or even eliminate machining at an ultimate saving.

In their handsome 36-page book, "Forgings," which is available to interested manufacturers, Australian Forge & Engineering Pty. Ltd. quote the standard tolerances applying to steel forgings under 100 lbs. each, which were adopted by the American Drop Forging Association in 1937.

Tolerances, we are informed, are either "Special" or "Regular." "Special" tolerances are those which are particularly noted in the specifications and may state any or all tolerances in any way as occasion may require. Special tolerances apply only to the particular dimension or thing noted. In all cases where Special tolerances are not specified, Regular tolerances shall apply. Regular tolerances fall into two divisions—"Commercial Standard" and "Close Standard." Commercial Standard tolerances are for general forging practice, but when or where extra close work is desired, involving additional expense and care in the production of forgings, Close Standard may be specified.

Close Standard may be specified for one or more of the following classes to which Regular tolerances are applicable: Thickness; Width (1. Shrinkage and Die Wear, 2. Mismatching, 3. Trimmed Size); Draft Angle; Quantity; Fillets and Corners.

It is not proposed to give complete figures in this article. As mentioned before, those

who are interested may obtain a copy of "Forgings" from the Company and study the figures for all classes of tolerance. To indicate the nature of these tolerances it will be sufficient to refer briefly to Class 1, which deals with thickness.

Weights referred to in the table range from 2 lbs. to the maximum of 100 lbs. At 2 lbs. the Commercial tolerance is minus .008 in. to plus .024 in.; the Close tolerance is minus .004 in. to plus .012 in. Both Commercial and Close tolerances are shown for 18 other weights up to 100 lbs., when the figures are: Commercial, minus .058 in. to plus .174 in.; Close, minus .029 in. to plus .087 in.

Thickness tolerances apply to the overall thickness of a forging. In drop hammer forgings, they apply to the thickness in a direction perpendicular to the main or fundamental parting plane of the die. In upset forgings they apply to the thickness in a direction parallel to the direction of travel of the ram, but only to such dimensions as are enclosed by and actually formed by the die.

The primitive tools of the ancient forgerman have become the mechanical wonders of today. The awe-inspiring hammer of Thor has become a reality, as in the powerful and modern forging equipment, used by Australian Forge & Engineering Pty. Ltd. And, in the same way as the ancient forgerman and the village blacksmith played an important part in the building of nations, so the A.F.E. organisation pursues its course towards the ultimate in forgings for the many branches of Australian industry.



## INDUSTRIES IN WESTERN AUSTRALIA

(Continued from page 225)

try, the charcoal iron undertaking at Wundowie has attained a production of 150-160 tons per week. The pig iron production has been beneficial to local foundries. Research work is continuing, and certain refinements are being incorporated in the furnace.

A tribute to private enterprise was the successful initial operations during the season of July to October last, of a local whaling company which operated from Point Cloates, on the North-west Coast of the State. For the season 190 whales were captured, which yielded approximately 1,100 tons of oil, valued at nearly £90,000 sterling, which was disposed of overseas. Meat meal was processed from the carcasses in addition to fertiliser from the residue. The Commonwealth Government has formed a Whaling Commission, which will operate next season from Babbage Island, near Carnarvon.

I am confident that when supplies of basic materials become easier and major undertakings recently commenced come into full production, employment in existing factories should rise to at least 39,000 almost immediately. I feel that I am not over optimistic when I claim that by the end of 1950, employment in secondary industry will reach 40,000—this apart from any possible new enterprises. When it is considered that at 30th June, 1939, factory employment was only 23,000, it will be seen that progress over the last decade has been factual, and that we "are holding our place in the sun." It is of interest to record that for the first time, employees in secondary industry in Western Australia represent a greater proportion than those engaged in primary production (excluding mining).

It is with pleasure that once more it can be recorded the year under review was practically free of strikes and major industrial disputes. The employer-employee relationships in Western Australia continue to be on a high plane, which provide immunity from disruptive interference of industry.

In conclusion, I look forward with my co-members of the West Australian Chamber of Manufactures to still further development of this State's secondary industries.

## WORKING FOR INDUSTRY

(Continued from page 104)

A word may be said here of Information Service's own series of publications. Summaries of Information, Bibliographies, and Lists of Selected References on various technical subjects are prepared from time to time, usually in response to outside enquiries. To ensure that the maximum use is made of these compilations (the number of which now runs into several hundreds) selected lists of recent titles are published periodically in various Australian journals for the information of their readers. The large numbers of requests for copies received as a result emphasises the widespread desire for information on "live" subjects collated in a readily accessible form. In addition, a Technical (T) Report series is issued. These are more general in scope, and are reviews of published and trade data on subjects of current interest, e.g., the silicone compounds. One of these, T.3 ("Wool Wax"), has been republished in the "Journal of the Textile Institute," and also as a book by an American publishing firm.

Information Service has a Translation Section, which collectively is capable of undertaking translation of technical material from practically all European languages. The services of this Section are frequently made use of by Information Officers dealing with technical problems which involve reference to foreign publications. The Section cannot undertake translations for the outside public, but its services are available to the extent that a register of approved outside translators is maintained and may be consulted on request.

Information Service also includes a section devoted to the dissemination of information collected and sent out by the Australian Scientific Research Liaison Officers in London and Washington. Much of this material is unpublished and might never reach those in Australia who could profit therefrom if it were not for this activity. There is also a cinephotographic section, concerned with the production of complete sound films on special aspects of the work of C.S.I.R.O. It is of special interest that a series of films dealing with the Organisation's work in the Murrumbidgee Irrigation Area is being produced for use by the N.S.W. Department of Agriculture for extension and instructional purposes.

The headquarters of Information Service is in Melbourne, and there is a branch office in Sydney. Branch offices in Brisbane and Perth are projected.

C.S.I.R.O. Information Service—Officer-in-Charge, C. M. Gray, O.B.E., M.Sc., A.M.I.E. (Aust.).

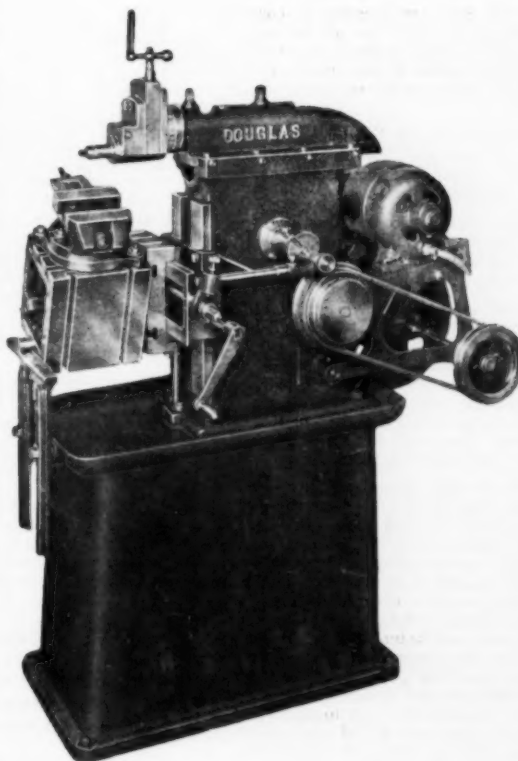
Melbourne Office: 314 Albert Street, East Melbourne, C.2. (Telephone: JA 6611).

Sydney Office: Phillip House, 119 Phillip Street (Room 507). (Telephone: BW 8924). Information Officer in attendance: A. M. Andrews, B.Sc.

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## WESTEELS Engineering Services

### Large Grouping of Special Resources to help industry

**A** MASSING of technical knowledge from leading world manufacturers—to deliver the best type materials, methods and machines. Products and services designed to ease some of your production, maintenance and repair troubles in the future.

**I**n early February, 1947, the Sheffield Corporation of America stepped out on a very unique programme.

In 1906 Hughes Wasserman, a brilliant Swiss metallurgist, set in motion a chain of developments that changed the whole outlook on modern welding technique.

Fifty years ago a group of engineers in England set about the job of designing a material to conquer the terrible searing temperatures produced when one surface travelling at high speed comes in contact with another.

Four decades ago Swedish metallurgists discovered that pure Swedish ores smelted with Swedish Charcoal made the best possible base for high quality steel.

Since 1930 Turco scientists have studied a delicate science called surface chemistry, and developed hundreds of cleaning compounds for every proven cleaning problem.

And so from small beginnings like this world industry sweeps ahead—a gradual pooling of one man's ability with another. Right now there's an upsurge of science in industry—big things are happening, engineers particularly are on the alert for the type of developments most likely to help them in the future. Yes, this 20th Century is a mighty busy and important time.

That's why Sheffield, mastercraftsmen in engineering design and construction, extended their good work and set up a division in Australia under the "Westeels" roof. In America leading manufacturers had long come to Sheffield for such contract services as the design and manufacture of tools, dies, jigs and fixtures, special purpose machine tools and the precision manufacture of threaded and formed ground components as well as sub and complete assemblies. Now, with plants operating in Melbourne and Sydney, Sheffield brings the same craftsmanship right to your front door. Similar type methods and machines are being used—and for proof of workmanship you should see the tooling and gauging work turned out for the Holden car.

That's why, in 1930, Hughes' son, Rene, continued research work and succeeded in perfecting the Eutectic Low Temperature Welding Process to a stage of unbelievable performance. To-day Eutectic opens its second huge plant in America and becomes one of the world's largest welding rod manufacturers. The success, of course, was almost an accepted fact because Eutectic had so many advantages over ordinary welding—being well below base metal melting points, forming exceedingly strong bonds through surface alloying, producing faster welds at lower cost, giving stronger, better colour matched joints and avoiding all the ill effects (distortion, buckling, warping, etc.) of high welding temperatures.

The big point is that import licences have been granted—"Westeels" will be again introducing the product to Australia.

That's why a group of English engineers triumphed over difficulties and set up the forerunner of the now enormous Ferodo organisation—a plant producing the most advanced type brake and clutch linings yet seen in industry. A skilled Ferodo man from England, Mr. Hibbert, has joined "Westeels" to help with the technical service department in surface friction problems.

For the same reason a group of experimental mills were established in Sweden to exploit these rare minerals. Now, of course, a chain of modern mills, under the ASSAB trade mark, are producing special purpose steel for 1,000 industrial uses—steel, it is claimed, that hasn't yet been matched. Buyers are writing from all over the world—even America imports large quantities. Through "Westeels," too, Australian manufacturers have already benefited from the remarkable range and quality of ASSAB Steel. Imports are steadily improving.

The same applies to Turco, who, in their 19 years, have removed most of the cleaning bugbears in most American Industries. "Westeels" are now making a complete range of cleaning and sanitising materials to exact American specifications. This, combined with the recent merger of the Andersen Engineering Co. (makers of the well-known steam cleaner), gives Westeels an opportunity to provide the most complete industrial cleaning service ever offered in Australia.

We must mention here, too, that our "Westeels" manufacturing plant is producing what will shortly become a piece of standard machine equipment for butchers. This is a new Meat Sawing Machine operating on the continuous bandsaw principle.

These are just some of the ways the "Westeels" organisation can assist you. This range of products extends from Small Tools to Materials Handling Equipment. As the Australian Industrial Horizon widens, manufacturers can look forward to more and more help from their trained staff.

#### "WESTEELS" SPECIALISED MANUFACTURING DEVELOPMENT

This represents a large number of men, materials and machines engaged in a double pronged attack, directed at two of Industry's greatest problems.

The first is under the care of the Sheffield Corporation of Aust. Pty. Ltd., and aims at providing the instruments to perfect the quality control of manufactured parts. The second problem is the age old one of Industrial cleaning. Dirt has been declared public enemy No. 1 by the Industrial Cleaning Division and Turco (Aust.) Pty. Ltd.—both are working together to promote the first complete cleaning service in Australia's Industrial History.

#### QUALITY CONTROL ECONOMY THROUGH PRECISION GAUGING.

Gauges are used to determine the dimensional fitness of a given finished work piece, to function alone or in the assembly of which it becomes a part. They assure the interchangeability of parts produced, prevent unsatisfactory parts from being made, and sort out correct from incorrect parts.

With improved gauging instruments and methods, the inexpensive mass checking of parts with full inspection of all critical measurements is the order of modern manufacturing.

In America, Sheffield have proved this true wherever parts are produced in mass. They are now the headquarters for measuring instruments, precision gauges and research. With identical standards of manufacturing, Sheffield in Australia should reach this same peak

—providing manufacturers with modern measuring instruments for Machine, Bench and Laboratory.

#### DIRT—YOUR PUBLIC ENEMY No. 1.

Not so long ago "Westeels" had this announcement: "A recent and outstanding development in the field of industrial cleaning was the teaming up of the best American Steam Cleaning equipment with the finest Australian products of that kind. This pooling of the best brains in what is undoubtedly a highly-specialised branch of industry has resulted in the production of the most modern steam cleaning equipment for Australia—equal to anything of its kind in the world.

Now, this has advanced further. Through the "Westeels" organisation, the science of Steam Cleaning has merged with the science of Surface Chemistry. The Company's factory at M<sup>o</sup>scot, N.S.W., is producing the famous Kerrick Steam Cleaning Machines and Hydro Steam Units. While at Camperdown, N.S.W., the Turco Plant is manufacturing over forty different cleaning compounds to exact American specifications.

All these factors when put together and moulded into a complete service will mean a speedy end to your most difficult cleaning problems.

All technical details on Sheffield, Kerrick or Turco can't be given here. But if readers will write to Westcott Hazell Engineering & Steel Ltd. on their company letterhead, complete literature will be sent direct.





better equipped than ever for the  
**TOUGH ONES!**  
more products and services to ease  
production headaches

Everybody enjoys prescribing cures for colds . . . we enjoy helping to ease the aching heads caused through a hundred and one industrial problems. That's why a "Westeels" salesman is found busy, in every Australian key industrial sphere. That's why the organisation has grown.

Of course we don't dare rely on our own prescriptions alone — not in a world where much brain-pooling is essential. A huge fund of practical knowledge from leading world manufacturers is continually pouring into our nerve centres — and sifted to see how much it can help you. New materials, methods and machines are weekly arriving from both here and overseas.

As our range of products and services spreads, so we become better and better fitted to handle the TOUGH ONES. Tooling problems, steel problems, gauging and testing problems, welding problems, industrial cleaning problems are just a few that occupy our daily attention.

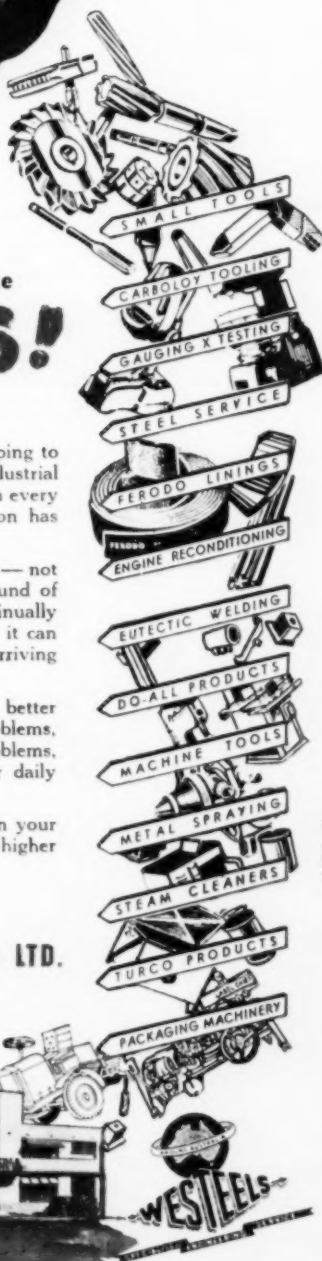
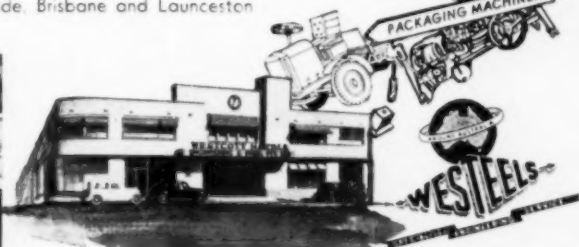
Let us prove to you how these products, when put to work in your plant, will result in greater and greater savings . . . higher and higher production. Some have to be seen to be believed.

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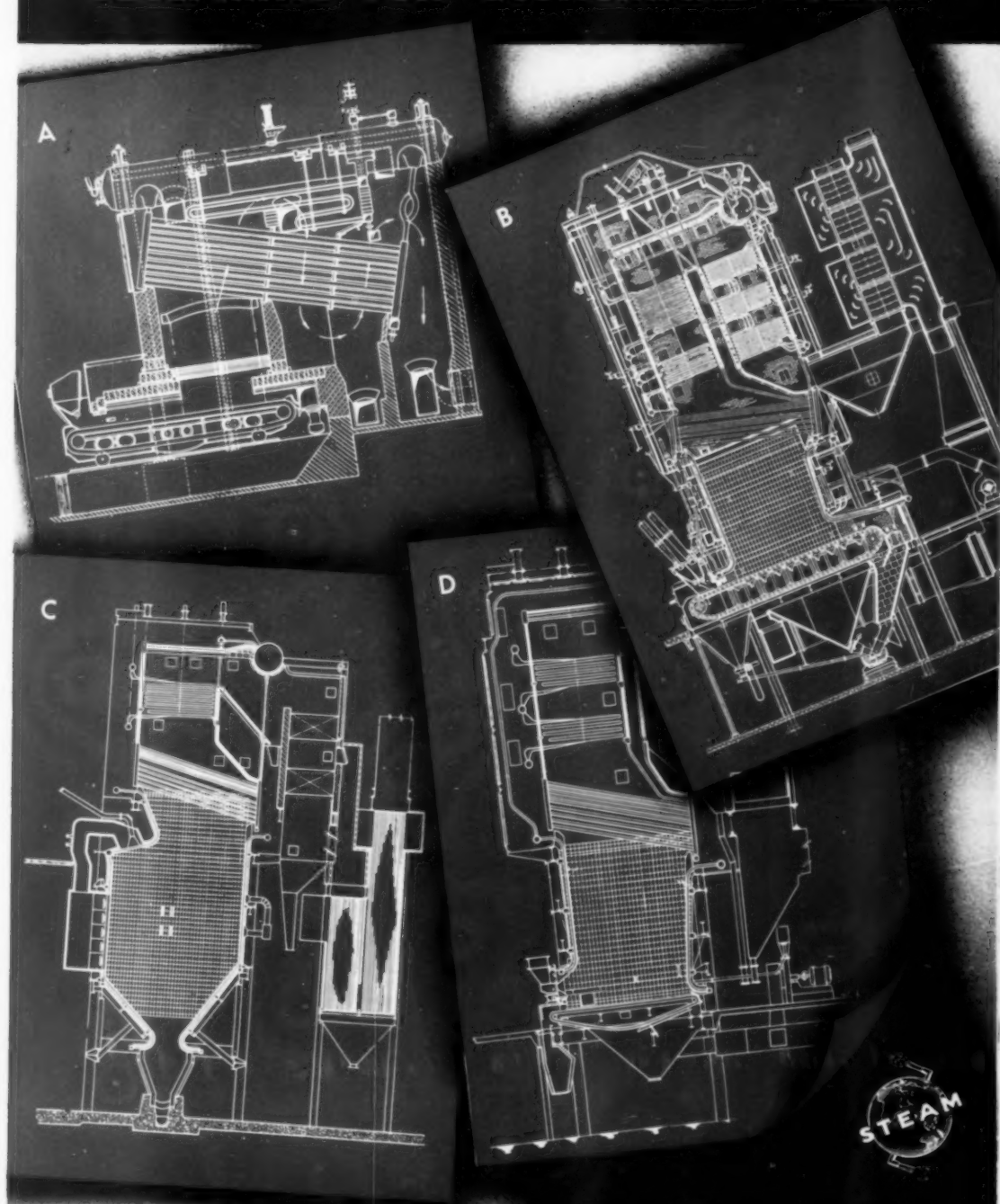
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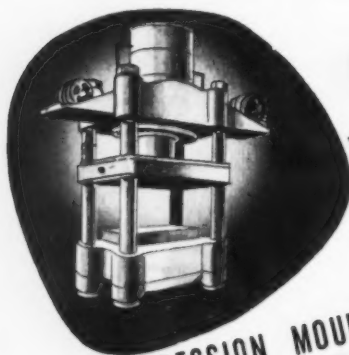
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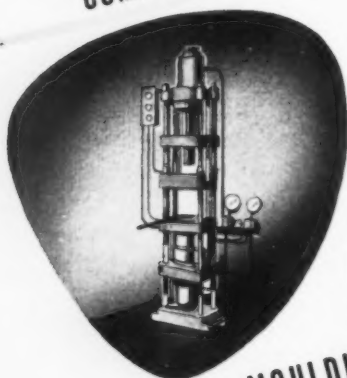
Securing utmost economy in steam generation, with maximum efficiency of plant, has been our achievement for over sixty years.

A: B. & W. "W.I.F." type boiler unit equipped with chain grate stoker; B, C & D: B. & W. Series Type boiler units; B, equipped with travelling grate stoker; C, arranged for pulverised coal firing; D, with Babcock-Detroit spreader stoker (RotoGrate).

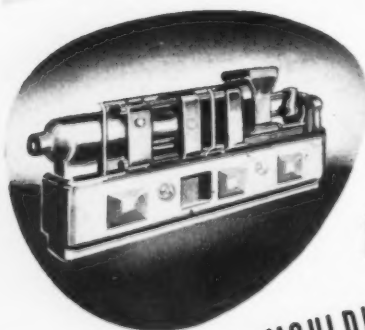


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## New Iron Foundry for Ronaldson-Tippett Nears Completion!



### Output of Ronaldson-Tippett Engines will be greatly increased.

Every modern idea in iron-founding technique will be incorporated in this new foundry — now nearing completion — for Ronaldson Bros. & Tippett Limited, of Ballarat, Victoria.

In its planning, Ronaldson-Tippett executives and their consulting and planning engineers have been determined that it should be the most up-to-date in Australia, so that the firm will be adequately equipped to handle the continually increasing demands for Ronaldson-Tippett Petrol, Kerosene and Diesel Engines.

On a capacious site half-a-mile from the present works, this foundry has been erected, and is now having the machinery and equipment in-

stalled. With the removal of the existing foundry from the present works a considerable area will be available for the installation of additional machine-tool equipment and further assembly lines.

With the continuing demand for Ronaldson-Tippett Petrol, Kerosene and Diesel Engines, the present production plant is hard-pressed to provide today's output. That many people have been prepared to wait for Ronaldson-Tippett Petrol, Kerosene and Diesel Engines, and specialised Electric Lighting plants—despite many competitive lines being readily available—is a tribute to the inbuilt quality of every product of this company. The new iron foundry will help to overtake this lag.

Through fifty years of continuous progress, in design and production methods, Ronaldson-Tippett engines and machines have been and are today the popular choice of government departments, leading companies, and discerning buyers all over Australia and in overseas countries.

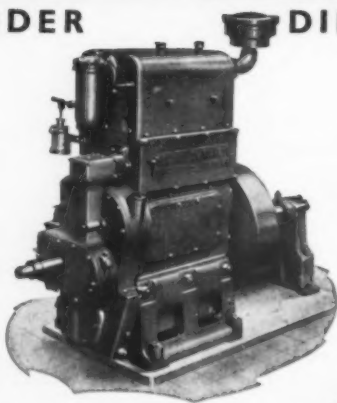
# RONALDSON - TIPPETT

## TWIN-CYLINDER

## DIESEL ENGINES

25-27½ h.p. Type "CK" twin-cylinder totally enclosed four-cycle vertical Diesel Engine, 1,000 r.p.m.

Available as tank cooled with extended crankshaft and outer bearing as shown at right; or as radiator cooled, mounted on fabricated steel base with extended crankshaft and outer bearing as shown at lower right, or fitted with clutch type power take-off as shown on 50-55 h.p. engine at lower right of opposite page. Hand starting standard. Electric starting at extra cost.

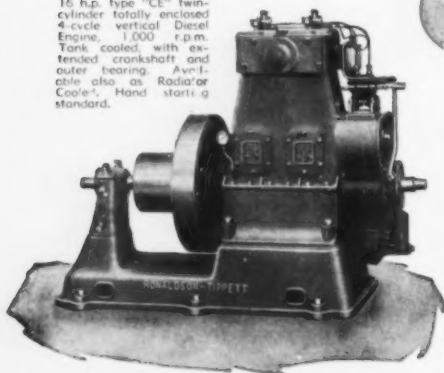


These Diesel Engines offer to the Australian and export trade that quality and reliability which have made the name of Ronaldson-Tippett known and respected all through Australia's primary and secondary industries.

They are eminently suitable for standard industrial requirements, and can be readily adapted for special applications such as irrigation, electric lighting, earth boring equipment, excavators, sawmills, stonecrushers, etc.

Enquiries are invited.

16 h.p. type "CE" twin-cylinder totally enclosed 4-cycle vertical Diesel Engine, 1,000 r.p.m. Tank cooled, with extended crankshaft and outer bearing. Available also as Radiator Cooled. Hand starting standard.

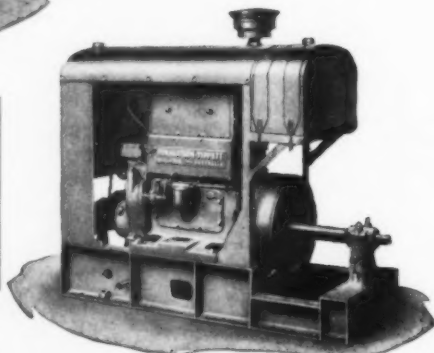


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#### Electric Lighting Plants

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- Full Automatic

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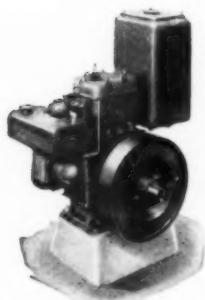


BUY THE RIGHT ENGINE FIRST

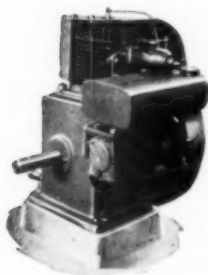


# Engines...

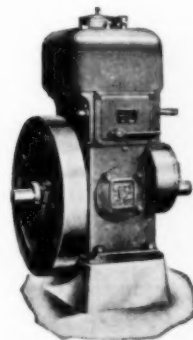
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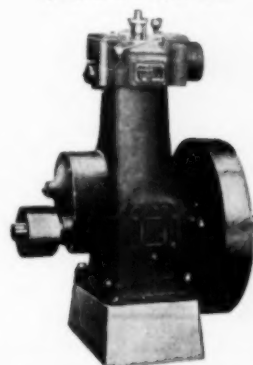
Type "N" Hopper Cooled, totally enclosed, roller bearing, vertical Petrol Engine. Also available as Tank Cooled.  
2 h.p. ... 1,000 r.p.m.  
3 h.p. ... 1,000 r.p.m.  
4 h.p. ... 1,100 r.p.m.  
3 and 4 h.p. available as Petrol-Kerosene Engines.



Type "NA" Air Cooled, totally enclosed, roller bearing, vertical Petrol Engine.  
2½ h.p. ... 1,500 r.p.m.  
4½ h.p. ... 1,200 r.p.m.



Type "CM" totally enclosed, roller bearing, vertical Diesel Engine. Radiator or Hopper Cooled.  
3½ h.p. ... 1,000 r.p.m.



Type "CF" totally enclosed Tank Cooled, vertical Diesel Engine. Available also as Radiator Cooled.  
5 h.p. ... 800 r.p.m.  
6½ h.p. ... 800 r.p.m.  
8 h.p. ... 1,000 r.p.m.

Designed by a company with half-a-century of specialised engine-building experience, and built by craftsmen using the finest procurable machine tools, these reliable, economical engines are in daily use in their thousands all over the Commonwealth and overseas, running farm machines, pumps, sprays, electric lighting plants, grain elevators, etc. — a diversity of duties faithfully performed by these popular power units, which are also readily adaptable for special purposes.

Continued insistence on "quality first" has earned for the Ronaldson-Tippett engine first place in the esteem of the Australian primary producer and industrialist.

Quality means long-life, economy in the use of fuel, reliability and freedom from breakdowns and costly repairs — factors which mean money saved in the long run.

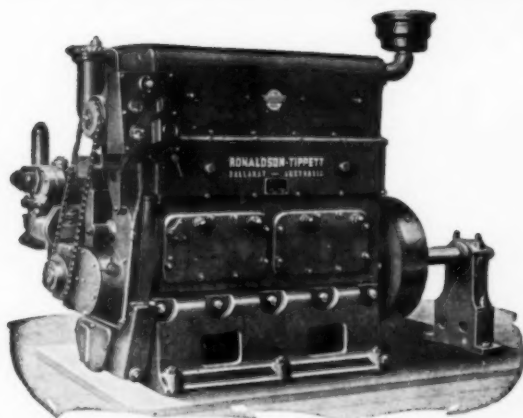
The choice is clear — the Ronaldson-Tippett engine has the many advantages which must weigh in its favour. Thousands of Australians have made it their first and best investment — why not make it yours?

## We also Manufacture . . .

Electric Lighting Plants	Milking Machines
Fruit Spraying Plants	Shearing Machines
Jetting Plants	Wool Presses
Chaffcutters	Dogsaws

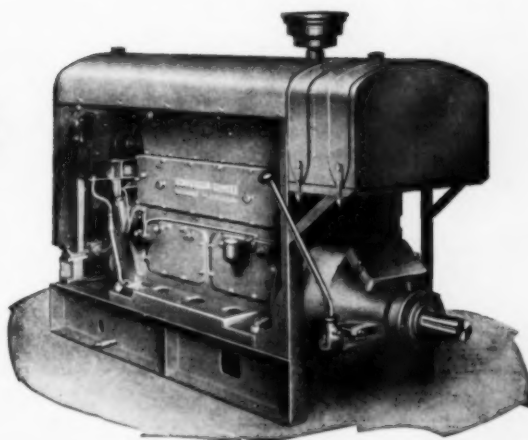
# RONALDSON-TIPPETT

## 4-Cylinder DIESEL ENGINES



50-55 h.p. Type "CK" four-cylinder totally enclosed four-cycle vertical Diesel Engine, 1,000 r.p.m.

Available as tank cooled with extended crankshaft and outer bearing as shown at left; or as radiator cooled, mounted on fabricated steel base, with extended crankshaft and outer bearing as shown fitted to 25/27½ h.p. engine at lower right of opposite page, or fitted with clutch type power take-off as shown below. Electric starting standard.



## RONALDSON BROS. & TIPPETT LIMITED

Head Office & Works: Creswick Road, Ballarat, Victoria

NEW SOUTH WALES: Ronaldson Bros. & Tippett Limited  
Fraser House, Cr. Bridge & Loftus Sts., Sydney.

QUEENSLAND: Ronaldson-Tippett (Qld) Pty. Ltd.,  
Scottish Union House, 127 Eagle St., Brisbane.

SOUTH AUST.: The Implement Co., 94 Grenfell Street, Adelaide.

WEST AUST.: The Westralian Farmers Co-operative Ltd., 569 Wellington St., Perth.

TASMANIA: Max Gooves, Davey St., Hobart.

NEW ZEALAND: Jas. J. Niven & Co. Limited,  
Wellington, Auckland, Christchurch, Dunedin.

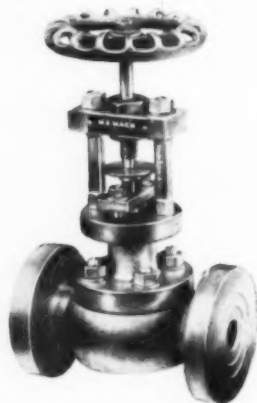
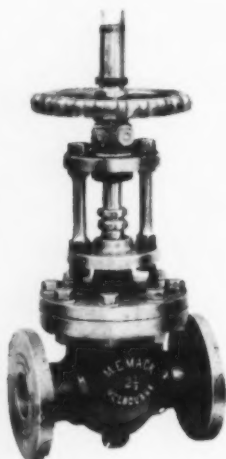
BUY THE RIGHT ENGINE FIRST

[Page 256g JUNE 15, 1950]

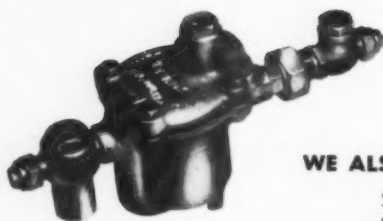
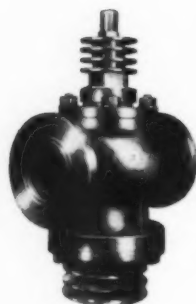


# VALVES

by M. E. MACK & CO. PTY. LTD.  
of MELBOURNE



Globe Valves  
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Check Valves  
Safety Valves  
Pressure Reducing Valves  
Diaphragm Valves  
Hydraulic Valves  
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Ball Float Valves



**SPECIAL ALLOY VALVES  
FOR CHEMICAL PLANTS**

## WE ALSO MANUFACTURE

Steam Traps  
Strainers  
Temperature Regulators  
Thermometers  
Pressure and Vacuum Gauges  
Hot Water Mixers



You are cordially invited to contact our Interstate Representatives.

TASMANIA:	SOUTH AUSTRALIA:	QUEENSLAND:	NEW ZEALAND:	WEST AUSTRALIA:
GILBERT A. SMEDLEY	ALFRED MARTIN & SON LTD.	ALFRED SNASHALL, ANTHON PTY. LTD.	J. F. HARGRAVE LIMITED	C. H. HINE & CO. LTD.
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AUSTRALIAN FROM PIG IRON TO PAINT

Reliable

**DAWN**

Products



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MACHINE VICES



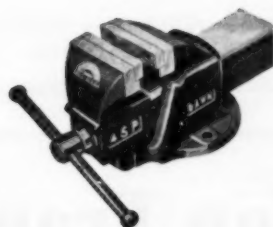
DAWN  
LIFTING JACKS



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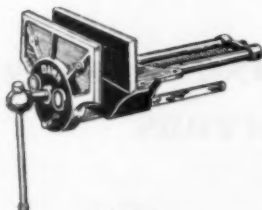
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DAWN  
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**ELECTRICAL**  
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**WIRE — RIBBON — STRIP**



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# "MARBRITE" BRIGHT STEELS



Write for the "MARBRITE"  
PRICE FOLDER, containing full  
price lists, specification sheets,  
tolerance tables, etc.

"MARBRITE" BRIGHT STEEL is manufactured in completely modern plant, to standard specifications, from specially prepared raw materials.

Metallurgically controlled, on a commercial basis, through all processes, "MARBRITE" BRIGHT STEEL can be supplied in a wide range of grades and in sizes and sections to suit most needs of manufacture.

*The following classes and grades are standard:*

#### BRIGHT MILD STEEL—

GRADE 1—Shafting  
GRADES 1B, 1A—High Tensile Shafting  
GRADE 2—Semi Freecutting Steel  
EXTRA SUPER—Freecutting  
LEADER—Freecutting for specialised purposes  
GRADE CH2—Case hardening

#### PRECISION GROUND—

Supplied in all "MARBRITE" Grades, to Standard or Special Tolerances

#### BRIGHT ALLOY STEELS, "MARBRITE"—

L5—3 per cent. Nickel—Case Hardening  
Q5—Nickel Chrome—Case Hardening  
L10—Nickel Molybdenum—Case Hardening  
Q7—Nickel Chrome—High Tensile  
R4—Nickel Chrome Molybdenum—High Tensile

#### AIRCRAFT STEELS—

To Standard Specifications

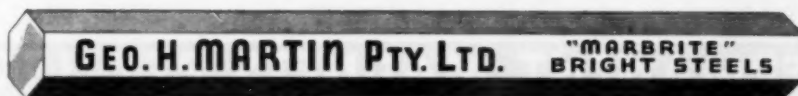
"MARBRITE" Rounds, in Grade CH2 and other suitable grades, can be supplied oversize to provide for grinding after heat treatment.

Special Sections.—A comprehensive range is available against order.

Precision ground bars are manufactured to Standard tolerances, with a wide range of Round sizes from 1in. to 6in. diameter.

Table A tolerances are within + .000 — .002 down to within + .00025 — .00025.

PLAN YOUR PRODUCTION WITH "MARBRITE" BRIGHT STEEL



"MARBRITE HOUSE"  
TELEPHONE: MJ 4341

**SYDNEY, N. S. W.**

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NON-ELECTRIC PERMANENT

# MAGNETIC PULLEYS



TRAMP IRON

*before* TROUBLE STARTS!

## POWERFUL

High Strength ALNICO magnets used.

## DEPENDABLE

Magnets last indefinitely. No Coils to burn out or Electrical Equipment to break down.

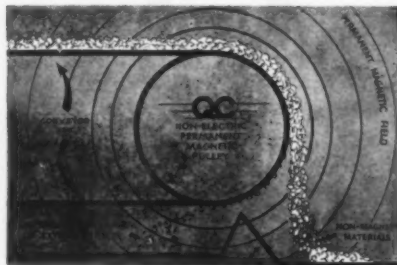
## ECONOMICAL

Installation Cost moderate since no Rectifiers, Control Gear, Wiring, etc., required. Operating cost nil since no Electric Power consumed. Maintenance negligible.

## SAFE

Absence of Slip Rings and Sparking eliminates Fire Hazard.

The Powerful Permanent Magnetic Field of Q.C. Pulleys will work efficiently through Belts made of Rubber, Canvas and other non-magnetic Substances. Satisfied users include Chemical Industries, Foundries, Mines, Fertiliser Producers, the Food Industry, Rubber Manufacturers, etc.



Other products include: Non-electric Permanent Magnetic Chute Separators, Overhead-type Separators, Magnetic Chucks, Permanent Magnets for Industry in *Alnico* and *Magnimax*.

## PERMANENT MAGNETS PTY. LTD.

11-13 McEvoy Street, Waterloo, N.S.W. Tel. MX 3494

VICTORIA: H. A. STANGER, 76 CAMPBELL STREET, EAST KEW, E.4. TELEPHONE: WY 1563.  
 SOUTH AUSTRALIA: PASCOE & CO. LIMITED, 282 PORT ROAD, WOODVILLE. TEL.: M 7127.  
 WESTERN AUSTRALIA: ALLAN WATSON, 35 BARRACK STREET, PERTH. TEL.: B 2596.



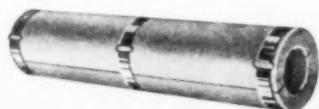


# INSULATION

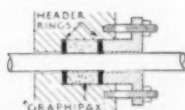
## HEAT

"SILEX" MAGNESIA SECTIONAL  
PIPE COVERINGS

In 2 ft. lengths.



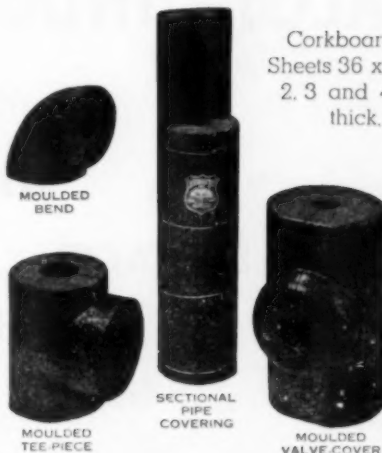
ASBESTOS AND MAGNESIA  
PLASTIC LAGGINGS



"GRAPHIPAX" PACKINGS, metallic and non-metallic, for Ammonia Compressors and Steam Installations.

## COLD

Corkboard in  
Sheets 36 x 12 x 1.  
2, 3 and 4 ins.  
thick.



"ZERISTO" CORK PIPE LAGGING

**W. H. Brewer Pty. Ltd.** 22-26 BLACKWOOD ST.,  
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## Q.C. MAGNETIC PULLEYS

### PROTECTION THROUGH MAGNETIC SEPARATION

WITH the rapid development of Australia's secondary industries, the need for magnetic separation has made itself felt in many manufacturing processes. For instance, in plants employing mills, grinders and other types of disintegrators, it has been found that the accidental occurrence of stray iron pieces could lead to considerable damage when allowed to reach machines unchecked.

MANY manufacturers, relying upon the purity of their final product, find the occurrence of stray iron a considerable nuisance. This applies mainly to chemical plants and food processors. It will be appreciated that in the latter case the problem is particularly serious.

Take, for instance, the case of a cereal manufacturer. The raw cereal is bound to contain an astonishing variety of iron particles ranging from bits of wire to nails, bale hooks, screws, etc. These particles are introduced partly during harvesting and partly during transport of the material.

It will be appreciated that it would be detrimental to the reputation of a manufacturer should, for instance, a nail find its way into the packet reaching the consumer. Moreover, should a nail be consumed, it could have dangerous consequences and lead the manufacturer into costly litigation.

Another instance where purity of the product is essential is the manufacture of plastic moulding powders. During the grinding of these powders small particles of iron are abraded in the grinding machines and are eventually contained in the finished powder. They are most undesirable to the plastic moulder who has to use these powders. For this reason manufacturers of plastic moulding powder are most careful to pass their product over magnetic separators which eliminate all traces of iron.

Tramp iron can be even more dangerous in plants where the atmosphere is of a combustible nature, as, for instance, flour mills. A stray iron piece reaching the mill and striking a metal surface can cause a spark, resulting in an explosion and fire. This hazard is also present in Textile Mills, where the textile fibres can easily be ignited. Though fire hazard in these mills is most dangerous, possible damage to machinery is also a serious consideration. Textile carding machines employ for the opening-up of the material toothed rollers which are expensive and are easily damaged by tramp iron.

The damage caused by tramp iron, and possible fire damage, even when covered by insurance, is a source of trouble and annoyance, which even the most generous Insurance Policy cannot always pay off. Production loss through the shut down is, of course, a most serious consideration. For this reason much thought and ingenuity have been expended to solve the problem of elimination of tramp iron. Mechanical means have been tried and were only partially successful. Electro-magnetic Separators were introduced, but suffered from serious drawbacks. Apart from being costly to install and to maintain, power failures, failure of the electrical equipment or windings, or neglect of the attendant to switch on the equipment, make their performance far from reliable. Instead of reducing the fire risk in many cases this risk was increased by the introduction of electrical gear with its

inherent liability to burn-outs and sparking.

Fortunately, the advent of the Non-electric Permanent Magnetic Separator has overcome all these difficulties. It has provided industry with an inexpensive and reliable tool for the elimination of tramp iron. These separators do not require current for their operation. Their power is derived from permanent magnets which are made from a special material which holds its full magnetism indefinitely. Even when in continuous use for many years, no deterioration takes place, and remagnetisation is never required. In fact, a Non-electric Permanent Magnetic Separator, once installed, can be forgotten from a maintenance point of view, and will do its beneficial work year in year out without running cost and with no possibility of a breakdown.

Permanent Magnets Pty. Ltd., of 11-13 McEvoy Street, Alexandria, N.S.W., who have been associated with the manufacture and application of magnets for over ten years, are well equipped to meet the Australian Industries' demand for these units. Separators are now manufactured in a large variety of different types, each designed to give the best protection in any particular case. An experienced engineering staff is maintained by Permanent Magnets Pty. Ltd. to advise users as to the best application of magnetic separation, and has saved large amounts of money to satisfied customers, which would have been lost otherwise by machinery breakdowns and production shut-downs.



**REMEMBER!**

# TALOIL INDUSTRIES PTY. LTD.

*Are Manufacturers of*

**DISTILLED**

**OLEIC ACID**

**STEARIC ACID**

**GLYCERINE**

**MIXED FATTY ACIDS**

**276 Bunnerong Road, Matraville, N.S.W.**

**FJ 2841**

## PRESENT POSITION OF OUR TEXTILE AND DYEING INDUSTRY

(Continued from page 82)

hands, and a fabric printing (silk screen) course. The Melbourne Technical College also intends to establish a separate textile school at Preston, Victoria. The Textile College of the Gordon Institute of Technology has a very comprehensive full-time day course for the Diploma of Textile Chemistry and the Diploma of Textile Industries which includes dyeing and cloth finishing. It is expected that dyers and finishers will be drawn from the graduates in the former. Prior to the establishment of these courses, the key men in the industry were brought from England or sent there for training. The College at Geelong and the schools to be established at Sydney and Melbourne are being partly financed by Commonwealth grants.

### STRUCTURE OF THE INDUSTRY.

In addition to commission dyers who constitute a separate industry, practically all big textile mills have their own dye-houses, and such mills do approximately 70 per cent. of Australia's dyeing and finishing.

Commission dyers and finishers are concentrated in or near the capital cities, chiefly in Sydney and Melbourne. Some of these firms handle all fabrics, but there is a growing tendency towards specialisation in particular fields such as woollens and worsteds, cotton piece goods, or yarn dyeing. Most of the firms are private companies with a subscribed capital not above £100,000, and with 30 to 50 employees. The largest commission dyer is a public company with an authorised capital of £250,000, the smallest firms merge into the garment dyeing industry. The largest firms, each of which has 100 or more employees, are:—

Amalgamated Dyers of Australia Pty. Ltd., Rushcutters Bay, N.S.W. (Dyers of cotton materials only).

Bradford Dye Works Pty. Ltd., Waterloo, N.S.W. (Dyers of piece goods).

Dyecraft Ltd., Braybrook, Victoria, and Brunswick, Victoria.

Some other firms with 25 or more employees engaged on commission dyeing, but not printing, are listed below. Where the firm named specialises in one type of production, this speciality is given, but this does not imply that other materials are not treated.

Baldon Dye Works Pty. Ltd., South Yarra, Victoria (Circular knitwear).

Burns Dye Works, Forest Lodge, N.S.W. (Yarn).

Gibbs Bros. & Sons Pty. Ltd., Abbotsford, Victoria.

Gibbs, Burge & Co., Richmond, Victoria.

William Lawrence Pty. Ltd., South Yarra, Victoria.

Leeds Dyeing & Chemical Works Pty. Ltd., Northcote, Victoria.

Textile Dyers & Bleachers Pty. Ltd., Rosebery, N.S.W. (Woolen and worsted piece goods).

T.H.D. Pty. Ltd., Brunswick, Victoria.

Allan Turner Pty. Ltd., Alexandria, N.S.W.

There is also a considerable number of smaller firms, and most textile printers (listed below) also undertake some commission dyeing and finishing.

A marked feature of the industry is the firm trading connection frequently existing between a commission dyer and the client. Most weavers or knitters send their products regularly to one finishing establishment from whom they have had satisfactory service, as the quality of the finish is a major factor in selling textiles.

Textile printers, mostly near Melbourne or Sydney, but with one large firm in Tasmania, vary widely in size. Generally they are private companies, but the largest is a public company with a paid-up capital of £210,000 and approximately 200 employees.

Some of the firms engaged in textile printing are:—

### Roller Printing—

Cocortex Fabrics Pty. Ltd., Fitzroy, Victoria.

Fabric Printers Pty. Ltd., Brunswick, Victoria.

Impression Textiles Ltd., St. Marys, N.S.W.

### Screen Printing—

Associated Textile Printers Pty. Ltd., Hawthorn, Victoria.

Dyecraft Ltd., Braybrook, Vic., and St. Marys, N.S.W.

R. M. Hoskins Pty. Ltd., Alexandria, N.S.W.

Silk & Textile Printers Ltd., Derwent Park, Glenorchy, Tas.

Tennyson Textile Mills Pty. Ltd., Gladesville, N.S.W.

Textile Arts, Reservoir, Victoria.

This list does not include manufacturers (such as garment makers), who print material for their own use; and not for re-sale, nor firms with small output. Several of these smaller firms, specialising in exclusive production of artistic quality, are not seriously affected by the high level of current imports. Several large printing firms, although separate organisations and taking work from various sources, are partially financed by large rayon weavers. Although there is considerable commission printing done in Australia, many of the firms concerned are also textile wholesalers. They purchase grey cloth and sell printed material to wholesalers and large retail stores.

A firm engaged in an industry closely allied to printing is Brelia Fabrics Finishing Co. Pty. Ltd., Reservoir, Victoria, and Camperdown, N.S.W., which produces striped awnings by the application of resin-bound pigments.

### GENERAL OBSERVATIONS.

Although most textiles produced in Australia are dyed and finished by the self-contained mills that also do spinning and weaving, there is a well-established commission industry. The principal activity of this industry is the dyeing and finishing of woollen and worsted piece goods, and it is estimated that in this field about 30 per cent. of Australian output (or 11 million square yards) is commission finished.

At present the output from woollen and worsted mill dye-houses is below their capacity, while commission dyers have an output of wool textiles in excess of their nominal capacity as key machines are being worked overtime or on a shift basis. The future of wool textile dyeing appears to be assured. Although a greater proportion of



**SAMSON**  
SERVICE  
PERFORMANCE  
DEPENDABILITY



A precision Grinder with a speed of 90,000 R.P.M. Suitable for work on 50-100 lbs. per sq. inch. No tool-tool can afford to be without one. Designed to increase output and lower production costs.



**OIL AND WATER SEPARATORS.**  
Designed to remove oil and water from your air supply. Type "M."  
(Two other sizes available.)



**THE SAMSON TYPE A.1 SPRAY GUN.**  
Skillfully engineered after giving sound and practical consideration to all phases and problems of Spray users where 100% finishing must be obtained at the lowest possible cost. A comprehensive range of Scale Set-Ups enable this Gun to be readily adapted to any class of work.

**SAMSON SPRAY EQUIPMENT PTY. LIMITED**

18 GORMAN STREET  
MARRICKVILLE, N.S.W.

Phone: LM 5651

total output may be mill finished when labour is available, there should still be adequate work for commission dyers. A return to more highly competitive trading in wool textiles would increase the proportion of top dyeing, and may increase the complexity of finishing processes.

As there is little fine weaving of cotton, the development of the dyeing industry has depended largely on the import of material in the grey for dyeing here. The throughput of such material has declined greatly from war and immediate post-war years, and present capacity exceeds demand.

During the last few years a rayon weaving industry has been established and dyeing equipment installed to cater for planned future output. At present rayon dyeing equipment is much in excess of current need.

The present textile printing industry has a screen printing capacity of approximately 6 million yards per annum, and a roller printing capacity of 5 million yards, both on a one shift basis. Output is below capacity for several reasons, the most important being competition from low-priced imported prints. Textile printers with close connections with weaving firms plan expansion to cater for the proposed increases in fine textile output. Independent printers, other than small specialist firms, consider the future uncertain unless some measure of protection is granted to the industry. The Australian demand for printed textiles is sufficient to sustain economic screen and roller printing industries, but it is doubtful if the existing industries can gain and hold an adequate share of the market in view of current imports of printed materials. A great deal depends on the outcome of the recent Tariff Board enquiry respecting rayons. In the cotton printing field, the most likely direction of possible de-

velopment seems to depend on the availability of low cost material in the grey which could be imported for printing; this, however, does not appear to be profitable under present conditions.

## VICTORIA'S MANUFACTURING INDUSTRIES

(Continued from page 92)

What does the future hold? It can be safely stated that the prospect, not only for Victoria, but for the whole of the Commonwealth, is brighter and more hopeful to-day than at any time during the last decade. The threatening shadow of socialisation has been lifted, and free enterprise can once again plan for the future and for a return to normal trading conditions. A release from Government control and the growth of healthy competition is the surest, and speediest, curb to the inflationary tendencies which were becoming so alarmingly obvious. This, allied to an "all-out" drive for increased production, would ensure for Australia an economic future second to none in the world; she would become the investment Mecca of industrialists and the goal of the best types of citizens of all countries, but this will not be until each member of the community, employer and employee alike, decide once again to foster the spirit of the old-time pioneers—to love and work for this great country of ours and contribute his or her quota towards its prosperity to the utmost endeavour.

Then, with the United effort of the whole community, freedom for industry and the individual, and the blessing of Providence, the next fifty years may well eclipse the last in happiness and prosperity for Victoria, the Commonwealth and all her people.

## ELECTRIC MOTORS IN AUSTRALIAN INDUSTRY

(Continued from page 148)

there is little or no load there is little or no resistance effort and little or no speed control. Then follows exasperation when a motor is too large for its work and speed control is expected.

From a properly applied slipping

type of motor highly satisfactory speed control is obtainable, but where infinitely variable and a very smooth wide speed range is needed for a process, the Commutator Type of motor is more desirable. When change from one fixed

speed to another fixed speed is required by a user, the best rotating mechanism yet devised, for the delivery of mechanical power from a shaft, is the squirrel cage type motor. But it is not always the correct motor for every drive.

For research purposes, special applications and sometimes just for the sake of making them, rotors have been made to run at 30,000

r.p.m. and higher. It is likely that machine tool makers will require more and more rotors, without shaft, as shown in Figure 5, for directly mounting on machine spindles to give power up to 40 H.P. with speeds at 150 cycles to the order of 9,000 r.p.m., perhaps higher. The challenge to the ingenuity and resources of the Motor Manufacturer is never ending.



## MODERN AIDS TO PRODUCTION

### EFFICIENT PRODUCTION THE KEY TO MANUFACTURING STABILITY AND PROSPERITY

WITH the gradual return to normal trading conditions and competitive markets, efficient production methods are now, more than ever, becoming essential in well organised industry. Electronic Industries Imports Pty. Ltd., already well established as a leading supplier of Machine Tools of all natures, have recently moved to their new large showrooms at 666 Chapel Street, South Yarra, Melbourne, and are now able to carry out their policy of supplying the right machine to do the job in the most efficient manner, and to follow up the supplying of the machine with the Technical advice and after sales service which is so important. Also, through the medium of their instrument division, they are supplying the necessary technical instruments to enable both scientific and manufacturing organisations to carry out the research and technical control which goes hand in hand with modern production methods.

THE wide range of machine tools and industrial equipment available from Electronic Industries Imports Pty. Ltd., includes machines and instruments for use in such widely varied applications as General Production Engineering, Woodworking equipment and Timber Handling, Material Handling and Loading, Heavy Electrical Reticulation, etc., and Technical Specialists are always available for advice.

Although the range of products handled covers most Engineering applications, the following selections give an indication of how the modern machine tool maker can help to improve production and to solve that difficult production problem.

#### C.V.A. AUTOMATICS.

These versatile machines need no introduction. Already they are in use throughout Australia, producing a wide range of components. The No. 8 machine handles bar stock  $\frac{1}{2}$  in. capacity, and the design is such as to produce extreme accuracy of product with the minimum of setting up and maintenance time. It is one of the fastest production tools available. Following the general design of the number 8 machine two larger models have been developed. The C.V.A., Number 12 Automatic, which will handle bar up to  $\frac{3}{4}$  in. diameter at speeds of from 64 to 5,540 r.p.m., and the C.V.A., Number 20 Automatic, which will handle bar up to  $1\frac{1}{4}$ . Throughout this range of Automatics can be seen the same versatility and ruggedness of design which has made the number 8 famous, and which is so essential to stable production.

C.V.A., realising that a complete production unit in the modern use of metals must make a balanced use of turned and pressed parts, also manufacture 10 ton and 25 ton dieing presses which are capable of producing a multitude of pressed parts in the most economical manner. Very fast strokes and automatic feeds are some of the features of these machines.

As well as the press equipment mentioned above, another very valuable addition to general press work is the range of automatic press room equipment manufactured on behalf of the U.S. Tool Co. Inc., of America, under licence in England by Rockwell Machine Tool Co. Ltd. This range covers Roll Feeds, Stock Straighteners, Slide Feeds, Wire Straighteners, etc. The main application being, for use on presses which are not normally fitted with roll feed and stock straightener equipment.

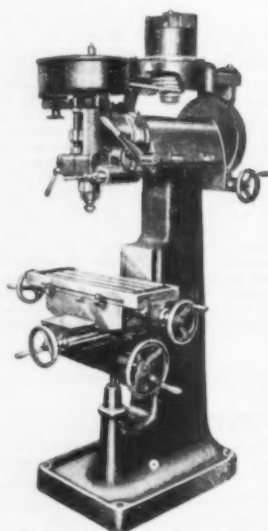
Both the Automatic Lathe and the High Speed Press depend for their final success on initial "tooling." The production of continuous runs of accurate parts with the minimum of maintenance can be said to be directly tied-in with the quality of tooling supplied to the lathe or press from the toolmaker. To produce high quality dies, cam shapes, lathe tools, etc., in the most economical manner,

the toolmaker must be supplied with the most modern and efficient toolroom equipment.

Amongst some of the more important tool room equipment handled by Electronic Industries Imports Pty. Ltd. are such machines as the C.V.A. Toolroom Lathe—one of the most accurate pieces of machinery to-day available, the Essex 32 Punch and Form Shaper, which proves so useful in the production of complicated Punch Shapes, and the E. H. Jones Number 13 Filing and Sawing machine. All of these machines can be seen at the new Melbourne showrooms.

Whilst the increasing use of automatic turned parts and pressed parts is enabling the production engineer to produce better and cheaper goods, there is yet another field in the fabrication of metal which is becoming increasingly important, and no modern metal part production unit would be considered complete without the means to produce parts by the diecasting process.

The Madison Kipp Corporation of America are of established repute in the diecasting field, and their Kippcaster Diecasting machines are now being manufactured in England by William Coulthard & Co., who are represented in Australia by Electronic Industries Imports Pty. Ltd. The range of Diecasting machines now freely available by this arrangement include machines for Aluminium, Bronze and Zinc.



The C.V.A. Vertical Milling and Diesinking Machine.

WOODWORKING MACHINERY.  
The conversion of timber through all the

stages from the rough log to finished products for building, furnishing, case making, etc., has in the post-war era become of increasing importance in Australia. If we are to house our increasing population and provide all the increasing requirements for fabricated timber, we must make available to the building and furniture trades the best of timber working machinery. Electronic Industries Imports Pty. Ltd. represent some of the finest manufacturers of Woodworking Machinery in the world, and the machines available from such firms as A. Cooksley & Co. Ltd., of London, Guilliet, of France, Karlebo, of Sweden, and Skoda, of Czechoslovakia, cover the whole range of woodworking operations from complete equipment for saw milling to a complete range of machinery for the furniture and timber trade generally.

#### HANDLING EQUIPMENT.

Whilst the handling of smaller parts can be carried out in a variety of relatively simple ways, the handling of larger equipment and raw products such as Sawn Timber, Cased Steel Sheet, etc., needs the aid of special equipments. One of the most versatile pieces of moving machinery available is the "Jumbo" Mobile Crane. This crane is fully mobile and can be used at the wharf, in the factory yard, in the field, and, indeed, as a general purpose handling machine for loads up to  $2\frac{1}{2}$  tons in a wide range of uses. Having hydraulically operated jib, with absence of cable, the crane is very safe and easy to use. It is extremely mobile and can be got in and out of the most confined spaces. Not only will it perform efficiently, all of the functions of a mobile crane in a manner previously unknown, but with the addition of a range of attachments can be used for such widely separated uses as Pole Setting, Bull Dozing, Shovel Scooping, Stacking with Fork or Platform list and Loading, etc. It is a crane which truly has to be seen to be believed.

#### POWER TRANSFORMERS.

In step with progressive means of production must go the development of Australia's latent electric power and the placing of this power at the disposal of manufacturers as required. Electronic Industries Imports Pty. Ltd. are pleased to announce that they are now representing Bonar Long, of Dundee, Scotland, who manufacture Static Power Transformers from the smallest Distribution Transformer to Distribution Transformer up to 15,000 KVA output, Welding Transformers in a wide range of sizes, and Underground Mining Transformers. Bonar Long have a long established reputation in England and the Continent, and have, since the war, been able to increase production to allow them to supply to such people as The Durban Corporation, South Africa, North Auckland, E.P.B. New Zealand, Electric Undertaking, San Salvador, Central America, etc., etc.

(Continued on page 278)





# PROMPT DELIVERY OF ALL TYPES OF INDUSTRIAL MACHINERY

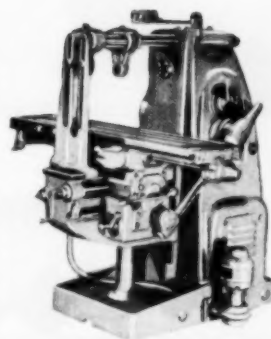
## Model 2D Milwaukee Milling Machine

In design and mechanical construction this Rotary Head Milwaukee Milling Machine combines the necessary strength, rigidity and custom-built precision to assure an extended period of profitable accurate performance. The operating controls on the Rotary Head Milling Machine are extremely simple and completely safe—necessary safeguards being incorporated to protect both operator and equipment. With an extensive spindle speed range of 250 to 4,000 r.p.m. and a feed range of .0002 to .008 inches per revolution, the Milwaukee Milling Machine is of inestimable value in a large field of cutting and boring operations.



## Model 2E (Plain) Milwaukee Milling Machine

The Model 2E was conceived after the most intensive survey of market conditions ever to precede a new Kearney & Trecker-Milwaukee Milling Machine development, and is built to fulfil three prime shop considerations: Efficiency of operation, ease of operation, and economy of operation. The Model 2E is a new machine tool embodying the fundamental requirements of sound milling machine design—ACCURACY, RIGIDITY and CAPACITY—and is built in keeping with the high standard of workmanship so closely identified with Kearney & Trecker-Milwaukee Machine Tools since 1898. There's a spot in every shop for a Model E.



INTRODUCING—one machine that gives you eight different functions . . .

# JUMBO

THE TAYLOR  
HYDRAULIC  
50 CWT.  
MOBILE CRANE

IT'S 8  
MACHINES  
IN ONE



IT'S A DOZER



IT'S A LOADER



IT'S A SCOOP



IT'S A LIFTER

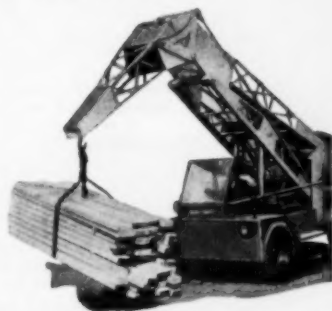


IT'S A POLE POSITIONER

The "Jumbo" is actually eight machines in one (some uses illustrated) . . . it can travel at 30 m.p.h. . . . is extremely manoeuvrable and is sturdily constructed. Being versatile the "Jumbo" eliminates the need for several different machines, which means large savings at the outset . . . Another important feature of the "Jumbo" is its low running costs and fuel consumption, while its sturdy construction obviates expensive maintenance bills.

For economy, dependability and versatility you'd be wise to see "Jumbo," the Taylor Hydraulic 50-cwt. Mobile Crane.

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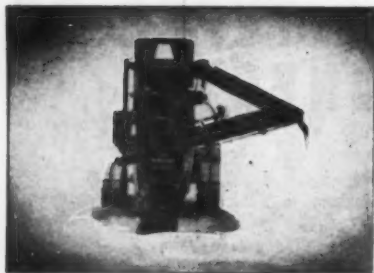
(Division of Electronic Industries Limited)

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It is our privilege to manufacture on behalf of, and to represent, many of the world's largest manufacturers, renowned for the high quality of their products and their careful selection of representatives. We are conscious of our responsibility to render a service worthy of these great names. Tutt-Bryant offer you a complete Engineering Service on all equipment distributed by the organisation.

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- Spare parts service.
- Technical advice and recommendations.
- Continued efficient service to owners.
- Comparative demonstrations of equipment.

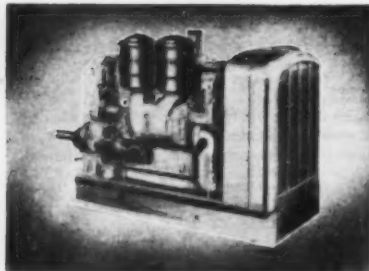
Our engineering staff is available to confer with you on problems of Earth Moving, Road Construction, Concrete Construction, Bituminous Construction and Maintenance, Lifting and Loading, Logging, Industrial and Marine Engine applications, Mining, Pumping, etc.

We extend to you a cordial invitation to visit any of our factories throughout Australia.

**LARGEST SUPPLIER OF CONSTRUCTION EQUIPMENT IN AUSTRALIA**

# *Tutt - Bryant*

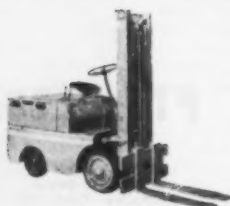
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SERVICE CENTRES THROUGHOUT AUSTRALIA



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## CONSTRUCTION AND INDUSTRIAL EQUIPMENT



### A Large Australian Enterprise

From small beginnings a few years ago, the Construction Equipment Industry has developed as one of Australia's major Secondary Industries. In the past ten years the growth has been very fast. Founded in 1938 as L. Tutt & Company, the development of the Tutt-Bryant organisation has been remarkable. To-day Tutt-Bryant is the leading organisation of its kind in Australia and is the largest supplier of construction equipment in this country.

Tutt-Bryant is playing an important part in the development of Australia's resources. The organisation has brought to this country equipment designed by the world's leading manufacturers, equipment which is at present being used in all fields of construction and other major projects. A wide variety of their machines is taking part in earth-moving and excavating, concrete and bituminous construction, open-cut coal mining and quarrying, dam and bridge construction, logging, loading and materials handling.

The secret of Tutt-Bryant's success is simple—people found that here was an organisation that was interested not only in their requirements, but also in their service needs. The men directing the Company's policy have had wide experience of the needs of industry, particularly in the construction field. The team working under them has been carefully selected for ability and experience. The Company handles to-day the widest range of construction and allied equipment sold and serviced by one organisation throughout the Commonwealth of Australia.

To keep abreast of modern trends and developments abroad, in the Construction and Allied Industries, the Tutt-Bryant organisation sends overseas every year one or more of its senior Executives. This continued interchange of ideas between key personnel of the Company and overseas manufacturers is of considerable importance to Australian Secondary Industry.

The Company has set up at its Headquarters at Rydalmere, N.S.W., Divisional Engineers, each specialising in a certain type of equipment, who can bring their expert knowledge to bear on the problems with which they are confronted. The Company is always willing to give advice on job-planning.

In New South Wales, Victoria, South Australia, Queensland, North Queensland and Western Australia there have been established Subsidiary Companies with factories for assembling, distributing and servicing the Company's products. A large and active field staff also operates in each State.

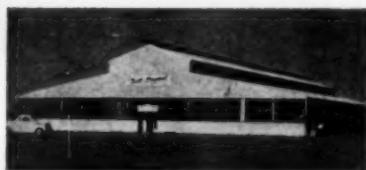
In Tasmania and New Zealand the Tutt-Bryant organisation works through progressive dealers. Service facilities and stocks of spare parts are carried by dealers to give prompt attention at all times. This system is being extended further by the appointment of competent authorised dealers in important country districts throughout Australia.

Keeping in step with Australia's industrial development, the Tutt-Bryant organisation has made many manufacturing agreements for the production in Australia of equipment urgently required for projects such as open-cut coal mining, water conservation schemes and other large construction projects. These agreements are of great importance to the national economy of Australia.

No product ever achieves nation-wide popularity and respect by accident. There must be real merit—genuine quality—backed by service, to establish and retain a high reputation. To grow from a small one man agency into the leading manufacturer and distributor in Australia of Construction and Industrial Equipment, all within the space of less than 12 years, is a clear indication of the quality of the products distributed by Tutt-Bryant and of the appreciation of its after-sales service.

#### RYDALMERE, NEW SOUTH WALES

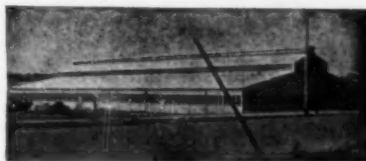
SYDNEY factory of Tutt Bryant Limited and headquarters of Tutt Bryant (N.S.W.) Pty. Limited has a covered floor area of approximately 82,000 sq. ft., built in 15 acres of land.



KILBURN (Adelaide) factory of Tutt Bryant (S.A.) Proprietary Limited has a covered floor area of approximately 22,000 sq. ft., built in five acres of land.



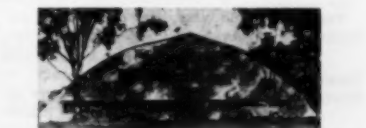
SALISBURY (Brisbane) factory of Tutt Bryant (Queensland) Pty. Limited has a covered floor area of approximately 60,000 sq. ft., built in 10 acres of land.



YARRAVILLE (Melbourne) factory of Tutt Bryant (Victoria) Pty. Limited has a covered floor area of approximately 26,000 sq. ft., built in eight acres of land.



BASSENDEAN (Perth) factory of Werfarners Tutt Bryant Pty. Limited has a covered floor area of approximately 22,000 sq. ft., built in 10 acres of land.



TOWNSVILLE factory of Tutt Bryant (North Queensland) Pty. Limited has a covered floor area of approximately 20,000 sq. ft., built in five acres of land.



# REX PAK and TULIP



The REX PAK range includes plastic, shredded metal, foil wrapped, asbestos cloth rod packings, steam hammer rings, metallic/fibre condenser packings, spiral wound rustless steel or monel and asbestos gaskets, cross laminated asbestos jointing, oil and petrol jointings, gaskets of every description.

All enquiries receive prompt and careful attention by our service department.

## MECHANICAL PACKINGS



The TULIP range includes moulded V section automatic packings for hydraulics and steam; cups, U shapes, braided and plaited asbestos and flax packings. Gauge glass rings.

The 1948 edition of "MECHANICAL PACKINGS" is available on request and contains full information concerning REX PAK, TULIP and DRAYTON products.

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DRICO Thermostatic Traps, Sight Glasses, Strainers.



DRAYTON Automatic Regulators, self-operating and relay types. Electrical Thermostatic Switches, etc., etc.

### DIGEST OF THE INDUSTRIAL YEAR

(Continued from page 90)

A new company, Maci Pty. Ltd., launched during the year, is being backed by the experience and manufacturing potentialities of a leading Australian and a pre-eminent British industrial organisation. Australian Consolidated Industries Ltd. and the Mitchell Engineering Group Ltd. London. The new venture will supply Mitchell steam generators and ancillary equipment, materials handling plant, cranes of every description, aerial cableways, skip hoists, and all types of pressure vessels.

With the manufacture during the year of enamelled wires, Australia entered an important new field of production. This development was the outcome of negotiations between Australian General Electric Pty. Ltd. and British Insulated Callenders Cables Ltd., which negotiations culminated in the registration in Sydney of Insulated Wires (Australia) Pty. Ltd. The new venture is manufacturing both synthetic and conventional enamelled wire.

Throughout the year, the question of incentive payments in industry received considerable attention. One particularly important happening in this regard was the survey of cross-sections of Victorian manufacturing industries conducted by the Research Group of the Institute of Industrial Management, Victoria. This survey confirmed the already-established fact that higher output, with higher wages for workers, is

the immediate and direct result of well-devised, well-conducted incentive systems. The survey also served to demonstrate two other significant facts. First, that the additional effort necessary to achieve the greater output was in no way prejudicial to the health of the workers, and, second, that the quality of the output was not impaired.

Unfortunately, however, the Trade Union movement maintains its attitude of hostility to the large-scale introduction of incentive payments, an attitude born of prejudice and completely out of harmony with present-day industrial legislation and industrial relationships, legislation which zealously safeguards the interest and welfare of workers, and relationships based on mutual understanding and goodwill. Despite the official hostility of the unions, however, systems of incentives continue to flourish and increase throughout the Commonwealth; systems which, in common with those operating overseas, are proving themselves boons to the nation, to its industries, to its industrialists, and, perhaps most of all, to its workers.

### DEVELOPMENT OF PLASTICS

(Continued from page 88)

Through its low price, Polystyrene is being extensively used by Australian moulders. Consumption has increased so far that Monsanto have announced their intention of manufacturing Polystyrene in Australia.

Extensive plans are being carried out for using Thermoplastic Moulding Powders and some firms are putting in additional equipment. Pierwood Engineering Co. have installed two 22-oz. injection presses which are far larger than any others installed in Australia. These are specially to cater for big industrial mouldings. Die Casters Ltd., of

Melbourne and Adelaide, are intending to manufacture plastic packaging materials and irrigation piping this year.

Production has considerably expanded in the use of Acrylics. Crystalate Ltd., in Sydney and Appleton Ltd., in Brisbane, are both producing a range of household sinks, basins and baths, etc. Other firms are fabricating imported sheets into motor-car trimmings, buttons and buckles, refrigerator fittings, liners, freezing chamber doors, crisper dishes, and containers, and also optical lenses. Brush backs of Acrylic are being produced with excellent sales. Reeded Perspex is being fabricated into fluorescent light fittings, and on account of its extremely light weight it is becoming very popular. At least seven firms are forming and fabricating reflectors and refractors. These are only used for fluorescent lighting. Improved moulding has increased production rates.

Many brushes are being tufted with Nylon monofil. During 1950 a plant will be established to make these in Australia, and these will replace the bulk of the imported Nylon monofil. P.V. Acetate in emulsion form is now being produced in Australia. This is used as a basis for water paint which can be used to dry with a glossy finish. In the Textile Industry it is used as a stiffener and for special finishing effects. It is also being used as a permanent sizing agent. In the Paper Industry it is used for bonding, laminating and grease-proofing. P.V. Acetate is used in the Leather Trade as a grain filler.

The technical side of the Industry is being looked after by the Plastics Institute of Australia, through active branches in New South Wales, Victoria and South Australia. Lectures are held regularly in each of the three States. The Plastic Moulding Trade is





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### CHECK THESE POINTS:

- ✓ "QC" Alloys are produced under our own laboratory control and to all specifications.
- ✓ "QC" Alloys can be supplied as castings, machined components or assemblies.
- ✓ There is a "QC" Alloy for every application—the right alloy for the right job.



A selection of "QC" Alloy Steel Castings

### For All Requirements in:

- Stainless Steel
- Corrosion-Resistant Alloys
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## QUALITY CASTINGS PTY. LTD.

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banded together in Sydney under the Metal Trades Employers' Association, and in Melbourne under the Chamber of Manufactures.

In December, 1949, the first meeting of the Standards Association Plastics Committee was held. It is expected that this will eliminate overlapping and make for smoother working when dealing with technical mouldings.

The Trade is kept informed of Plastics developments through the Plastics Section of the "Australasian Manufacturer," the "Australian Plastics Journal," and the new "Practical Plastics," each appearing monthly.

During the year the Tariff Board held a Public Inquiry into what rates of Duty should be imposed on Synthetic Resin Plastic Intermediate materials, as well as re-grouping for Customs purposes. During the hearing a great deal of evidence by all sections was given. The scope of the inquiry was very broad and its effects, after its ultimate decision, will be felt throughout the whole Industry.

The overall picture of the Plastics Trade in Australia is sound. The settling down after the war years has been carried out very satisfactorily, and increased expansion is to be

expected in practically all fields of the Plastics Industry.

### SIXTY-TWO YEARS OF SERVICE

(Continued from page 168)

are a heavy duty Massey Hammer and large forging and pre-heat furnaces. In the machine Shop five new Ward Turret Lathes have been installed, and other heavy machines are on order with the overseas manufacturers. Three large new drilling machines of the Radial Type, which replaced older models, have been in operation for only two years. Machine Moulding is carried out in the iron and non-ferrous foundries in order to step up production beyond the pre-war levels.

### EMPLOYEE AMENITIES.

Realising the amenities necessary to maintain a happy staff modern dining facilities have been provided. Hot water is available at the turn of a tap in the shower and washing rooms. Lock-up cabinets are also provided for each member of the staff. This all too brief survey of the Intercolonial Boring Company Limited will indicate in some measure the activities of one of Queensland's leading industrial and manufacturing concerns.

### CHEMICALS FOR INDUSTRY

(Continued from page 157)

there is the possibility of the accumulation

of scale. This scale reduces the rate at which heat can be transferred from the material to be cooled to the cooling water. This is true, whether the plant be a condenser connected to a marine engine or a land power station, the cylinder jackets of a diesel or other internal combustion engine, or any similar unit.

The design of these heat-exchange plants is usually complicated, making dismantling and reassembling costly in man-hours and money.

The use of "Noricen" descaling agent and such materials as trisodium phosphate, trichlorethylene and "Liscapol"-N makes it possible, without any dismantling, to remove scale and grease deposits from units such as are described above. ICIANZ can supply these materials and also have facilities for carrying out the work on behalf of customers if desired.

In this short article, it has been possible to mention only four of the ways in which ICIANZ is servicing Australian manufacturers, but the number of chemicals used in industry is very large and the field of useful applications particularly extensive. The practical experience gained by a specially trained team of industrial chemists and engineers, who have rendered technical service to hundreds of plants throughout Australia, is at your service.

Information, advice and technical literature are freely available whenever required.

## "THE BLUE BOOK" OF AUSTRALIAN INDUSTRY

### "THE AUSTRALASIAN MANUFACTURERS' DIRECTORY"

1. List of Factories. 2. List of Articles made, and names of makers. Price, £2/10/-; Overseas, £A.2/15/-.

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"SHUAPART" PARTING POWDER  
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"HARD ION" IRON CEMENT

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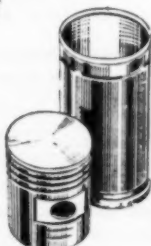
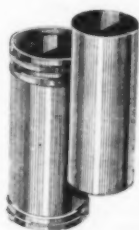
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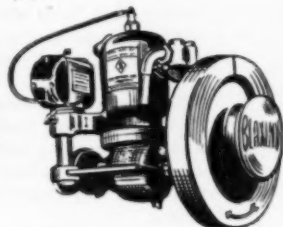
# PRODUCTS BY BLAXLAND RAE

There is a wide range of engineering products bearing the Blaxland Rae trade mark—a guarantee of high standard work and service. This range includes the famous Blaxland-Chapman low to medium horse-power marine engines, centrifugally cast cylinder liners and sleeves, speed reduction gear units, confectioners' and pastrycooks' machines, portable pumping units. In addition, Blaxland Rae are fully equipped for complete engine repair service, using modern precision methods. There is also a first-class gear-cutting plant with a capacity to handle all general types of work.

## CENTRIFUGALLY CAST CYLINDER SLEEVES (Dry)



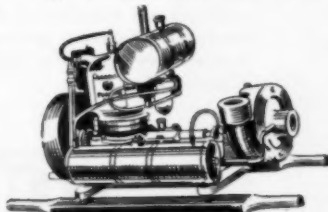
TRACTOR  
CYLINDER  
ASSEMBLIES  
(Wet)



3 1/2 H.P. BLAXLAND "PUP"

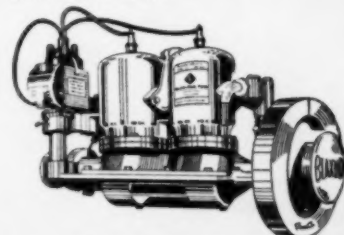


SPUR, SPIRAL, WORM  
and  
BEVEL GEARS

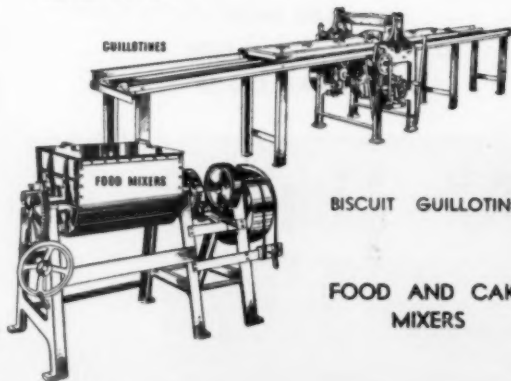


PORTABLE PUMPING UNIT

Capacity: 5,000 gallons of water to a total of 50 feet—with 2" suction, 2" delivery.



5/7 H.P. BLAXLAND  
Twin Cylinder



BISCUIT GUILLOTINES

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## BLAXLAND-CHAPMAN

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- WONDER LAUNCHES
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Renowned for Simplicity, Reliability and Durability, there is a Blaxland-Chapman or Chapman Marine Engine for most boating applications, in sizes ranging from 2 1/2 H.P. to 20 H.P. Engines are guaranteed for five years and are supplied complete with all fittings and accessories. The 3 1/2 H.P. Blaxland "Pup" and 5/7 H.P. Blaxland Twin Cylinder (illustrated here) are notable examples of these efficient power units, embodying features that give safe, simple and economic operation under all conditions. Notable, too, for style, performance and seaworthiness are the Chapman Wonder Launches. These launches are available in 16 ft. open and half-cabin, and 18 ft. half-cabin models.



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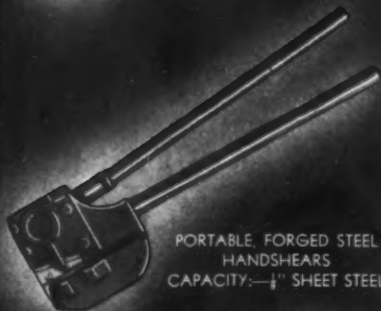
FORGED STEEL  
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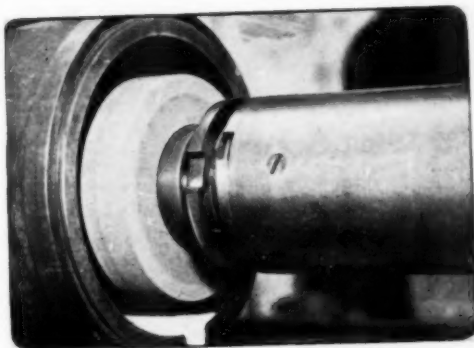
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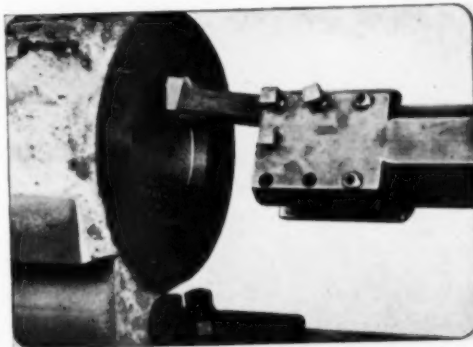
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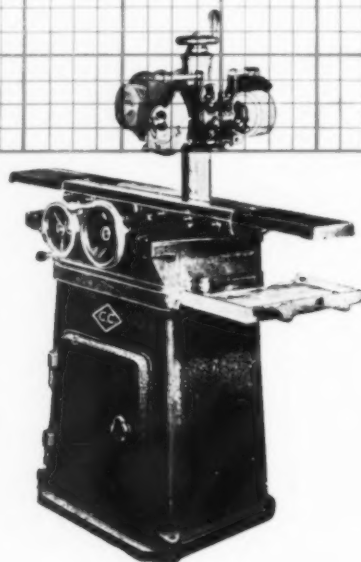
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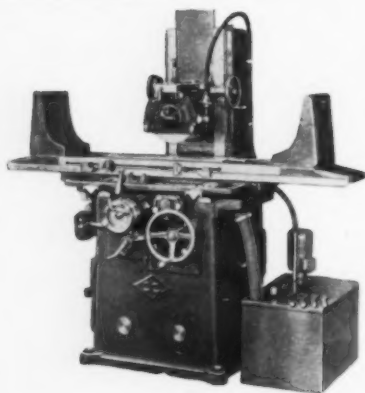
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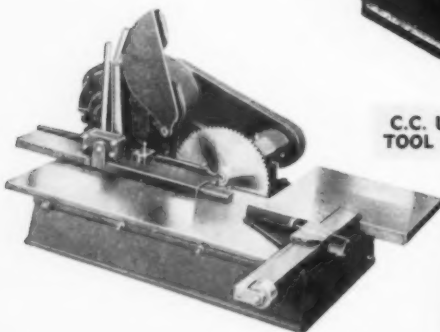
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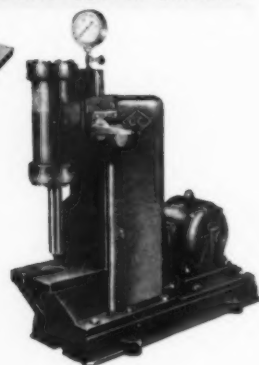
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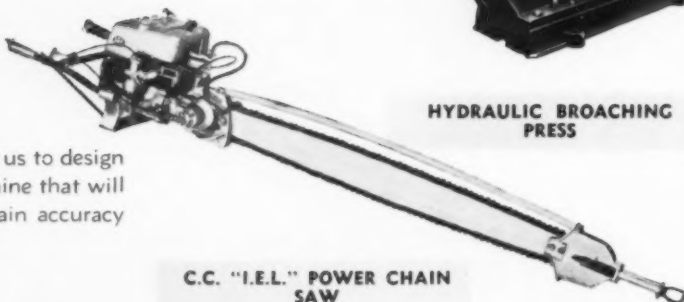
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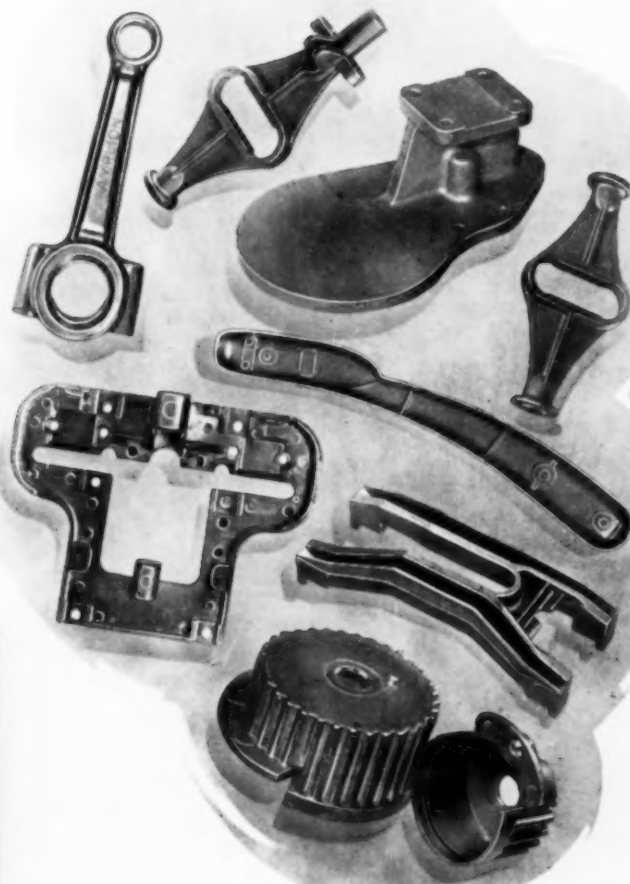
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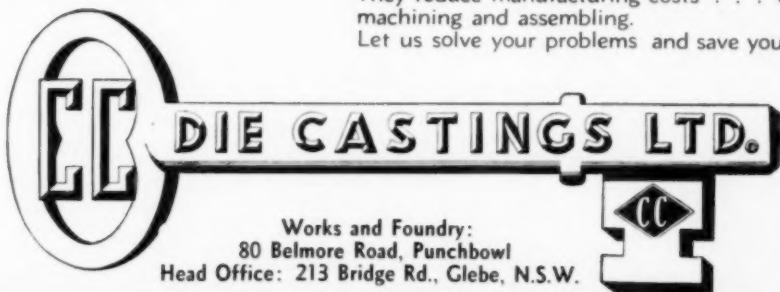
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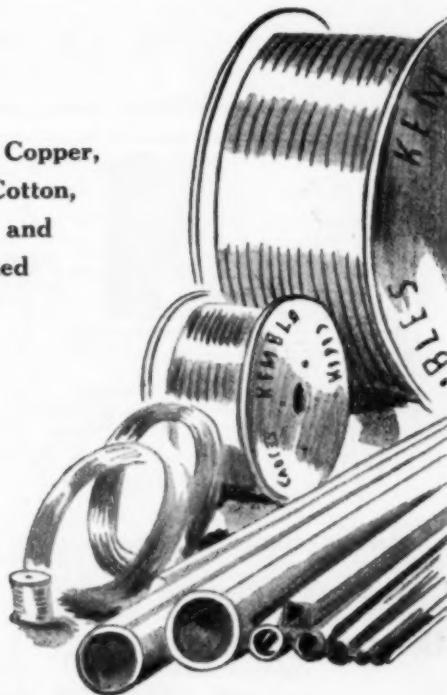
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WOOD -  
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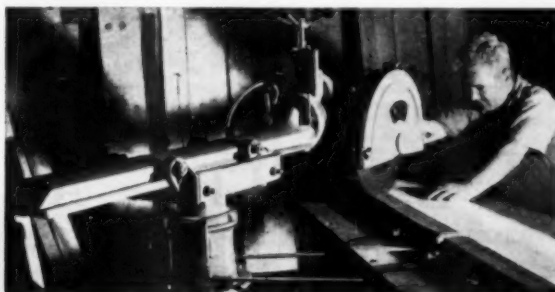
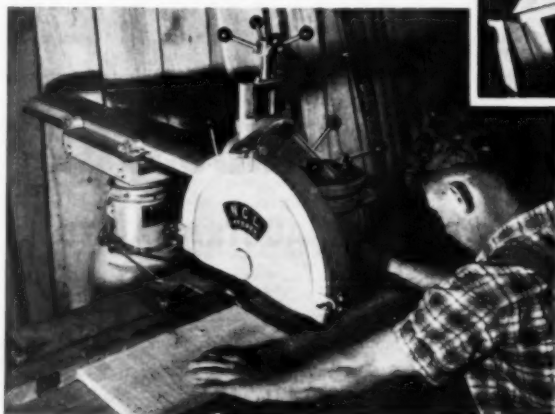
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Though the N.C.L. "Universal" is of sturdy construction, it is, withal, extremely manoeuvrable and light to the touch . . . no especial skill or training is required to operate it efficiently right from the onset.

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The N.C.L. "UNIVERSAL"  
IS SIMPLE, SAFE . . . IT REQUIRES NO SPECIAL  
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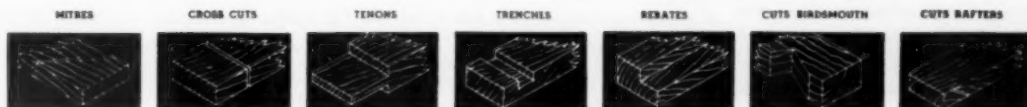
This one machine will give the accuracy and production of many single purpose machines.

The motor is specially designed for its job. It has a high tensile steel shaft extended to accommodate ganged saws or cutter heads.

All tool changes and adjustments can be made in a matter of moments . . . from in front of the work table . . . the operator does not leave his normal working position.

Frame Castings are of close grained grey cast iron heat-treated to prevent distortion. All parts are precision finished.

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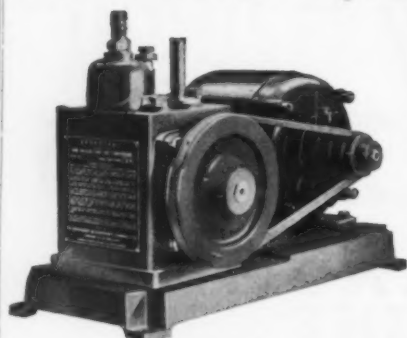
Maximum Saw diameter	18"
Ram Travel	26"
Maximum depth of cut	5"
Vertical adjustment on saw	9"
Approx. weight of machine	7 cwt.

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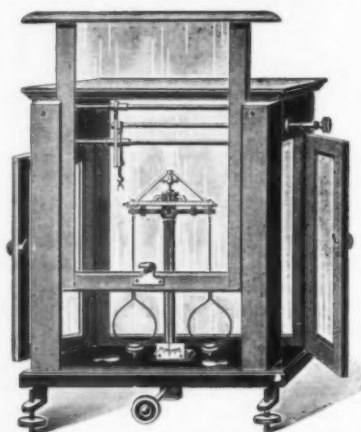
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THE name of H. B. Selby Australia Ltd. has been so closely connected with the importation and supply of high class Scientific Instruments, Laboratory Equipment and Analytical Chemicals over a period of fifty years that users of such items need no fresh introduction.

However, recent developments which may not be so well known should be mentioned. The first important move has been the consolidation of the separate Selby Companies into one major Public Company with Branches in Melbourne, Sydney and Brisbane, and Agents in the other States. Of these Branches it should be noted that Brisbane as a separate Branch is a very recent venture, as the Company only commenced operations in its modern showroom there in June, 1949. The fact that this Branch has been welcomed by Industrialists in that State is evidenced by the ever increasing demand on the wide range of stocks held there.

The formation of the Public Company has

resulted in an ability to provide a better service in each State by virtue of the mutual assistance available as well as the obvious benefits to be gained by collective and selective buying; this has resulted in a wide range of Equipment being held by the various Branches where modern showrooms allow the Apparatus to be displayed in such a way that it may be conveniently inspected.

However, overshadowing this aspect of the Company's expansion is advancement in the manufacturing field. In accordance with their policy of ever increasing service, the Directors of the Company realised the inconvenience being caused to Industrial Laboratories by Australia's continued dependence on Overseas Suppliers for special Equipment. Accordingly they formed a subsidiary Company to produce special individual pieces of Glass Apparatus made in accordance with Customers' own Specifications. This has been so successful in the three years of production that great ex-

pansion has been necessary, and much complicated Glassware, previously imported, is now manufactured in this Factory to the complete satisfaction of the user.

In addition, the Factory mass produces Analytical Weights and other special Weights as well as general Laboratory Metal Ware. It is worthy of note that Analytical Weights produced and adjusted in Selby's Factory have been pronounced by the Metrology Section of the National Standards Laboratory as being the equal of and in some cases superior to imported Weights both in so far as the finish and accuracy are concerned.

The importance of this work both from the point of view of the convenience of individual Laboratories and from that of Australia in the event of any National Emergency cannot be over-emphasised.

Inquiries for any special Glass and Metal Laboratory Apparatus will be welcomed by any of the Company's Branches or Agents.





## INDUSTRIAL DEVELOPMENT IN N.S.W.

(Continued from page 72)

each case. To facilitate the establishment of one £10,000,000 rayon factory, for instance, a new railway connection including a long river-bridge is being constructed. In some cases the Government gives priorities for housing and other building materials. Special freight rates for rail transport are sometimes conceded; while power and water supplies may be arranged under favourable conditions where the nature and location of the new industry are considered such as to warrant special treatment.

The last ten years' growth of manufacturing industry in New South Wales may be indicated by a comparison between employment figures in 1939 and 1949 respectively. The total number of persons working in factories:—

1939, 229,000; 1949, 376,000—increase, 64 per cent.

Of course, the war was the greatest factor in stimulating this development, both by forcing Australia to introduce new industrial techniques and to adopt new standards of quality and precision in the manufacture of weapons and equipment required for the fighting services; and also by drastically reducing our importation from overseas of innumerable types of goods which we were thus obliged to make for ourselves.

Nevertheless, the State's industrial expansion did not cease—did not even slacken—with the end of the war. Since 1945 there has been a steady transfer of many industries from Britain to New South Wales, while a number of American companies also have established plants here. Yet the greater part of our development since the war has been due to the further expansion of existing Australian manufacturers.

During the four post-war years, 1946-1949, the number of factory workers in N.S.W. increased by 61,000. Even in this period, however, manufacturing industry was struggling through hampering difficulties, especially a serious shortage of labour and recurrent shortages of materials. Now, for the first time since 1939, as a result of immigration, there is almost sufficient labour available to man all our existing industries and to allow for many expansions which have been deferred until now on account of the labour shortage. With the consequent increase in production of steel, coal, and building materials, we can confidently expect greater production all along the line. Bottlenecks are being broken; the flow of material is becoming at last adequate and regular; new machinery and equipment is coming forward; in short, the whole of our industrial organisation, for the first time in ten years, is now able to work at something approaching its maximum productivity and efficiency, and to expand in future as fast as our fast-growing population will require.

New South Wales still maintains, and is still increasing, its lead in manufacturing industry in Australia.

## FACTORY PRODUCTION RISES IN N.S.W.

(Continued from page 79)

R. J. Heffron, as "marking the beginning of the most significant educational project of this century in Australia." It is here interesting to record that this university is not only the first of its kind within the Commonwealth, but also within the British Empire. Its objects are:—

- (1) The provision of facilities for higher specialised instruction and advanced training in the various branches of technology and science in their relation to industry and commerce; and
- (2) The aiding by research and other suitable means of the advancement, development, and practical application of science to industry and commerce.

The Council of the new University has decided to proceed with the establishment of Chairs of Metallurgy; of Mechanical Engineering; of Applied Mathematics; and of one of the Humanities. The importance of this newly-established seat of learning rests on the fact that it will discharge one of the most important functions of our age—the training of men and women in advanced science and technology.

The illuminating facts and figures here cited clearly demonstrate that industrial New South Wales faces a future as bright in promise as its past is rich in achievement.

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Sole N.S.W. Distributors for PLURA COUGH MIXTURE, a linctus for the speedy relief of Asthma, Bronchitis, Influenza, and the Common Cold. Interstate and South African distributors wanted.

"WANTED" — Distributors or Commission Agents for our Magnet Products.

"WANTED" — Overseas Agencies with Australasian rights for Chemical, Electrical, Engineering, or any other good saleable lines.

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Cnr. Union and Pyrmont Street, Pyrmont, Sydney, N.S.W., Australia. Telephone: MW 2256

## MODERN AIDS TO PRODUCTION (Continued from page 264)

Their transformers are of the most modern design, and emphasis has been placed on the production of a Transformer of maximum reliability and efficiency. Their transformers are now available for shipment to Australia, and full details can be obtained on request.

Another important item in the production programme is the supply of prime movers for the individual motorisation of machines, exhaust fans, etc., and Electronic Industries Imports Pty. Ltd. are now in a position to offer a complete range of electric motors of all types manufactured in England by Howells Electric Motors. This well-known company manufactures not only the more familiarly known squirrel-cage motors in variety of speeds and horse powers up to 55, but can also supply High Torque, Slip Ring, Repulsion Induction, Lift and Hoist, and totally enclosed motors. Large stocks of motors are carried in Australia, particularly in the higher horse powers, so that there is little delay in delivery.

## INDUSTRIAL AND RESEARCH INSTRUMENTS.

As mentioned above, the degree of instrumentation which is required in both industry and research is increasing rapidly, and must continue to increase if we are to maintain the quality and widen the range of our products. Electronic Industries Imports Pty. Ltd. represent in Australia a number of Electronic and Physical Instrument manufacturers, amongst whom are Dawe, Furzehill, Pye, Unicam, All-tools, Bowdler-Godfrey, and they are in a position to help on all enquiries for instruments to be used in research and industry.

Typical of some of the instruments which are finding increasing usage in industry are the Dawe Sound Level Meter which is an instrument for determining the noise in a factory and assisting in finding means to eliminate that noise. The Dawe Stroboscope for measurement of speed and slowing of moving objects is becoming of increasing importance, enabling quick and easy speed measurement.

Unicam Instruments are supplying instruments for research in high temperature metallurgy and metallography and apparatus for use in crystallography, spectrophotometry, chemistry, etc. Furzehill Laboratories, Pye and Bowdler, Godfrey can offer a range of electronic instruments for usage in such applications as research in the radio industry and general research purposes.

These few examples give some indication of the range of machine tools, instruments and appliances which are now available as aids to production, and the following brief resume indicates other items which are handled by this progressive company.

C.V.A. Electric Motors and Drill Chucks, Bullows Pneumatic Compound, E. H. Jones Precision Watchmakers' Lathes, Delapena Precision Honing Equipment; Deltron Radio Frequency Heating equipment; F D Simms Enamelled Copper Wires.

## THE SCIENCE OF ELECTROPLATING

(Continued from page 105)

In any electroplating plant high values of Direct Current of comparatively low Voltage are a necessity, and modern practice seems to favour the use of rectifier equipment for supplying these currents. In this regard, Australian Platers are well abreast of the time,

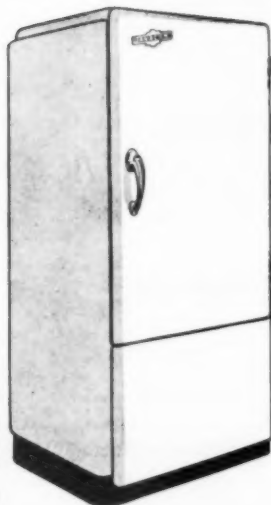
their demands for this type of equipment having warranted local Manufacturers designing their products to suit Australian conditions and specialised applications.

The anodising of aluminium and its alloys is not, of course, a plating process, but it is frequently performed by platers since they possess all the necessary equipment. This process, besides imparting to aluminium an extraordinary wear and corrosion resistant skin, also forms the first stage in the production of surprisingly beautiful effects in dyed aluminium and in the reproduction of designs and photographs on this metal. A very smart and durable type of nameplate and label incorporating, if necessary, half tone photographs, is being processed by this method.

Electro-polishing is a similar process, the object being made the anode instead of the cathode in the electrolytic cell. A number of manufacturers of stainless steel articles are utilising this almost miraculous process to put the final shine on their products.

It is hoped that this review has succeeded in its object of setting out, in a condensed form, the present status of the plating trade in Australia, and that it is realised that specialised science is playing an ever increasing part in effecting considerable improvements to the finish obtained, as well as reducing the processes involved in obtaining such results.

The fact that the Electroplating Trade in this country fully recognises that scientific "Know How" is absolutely essential for success augurs well for the future, and we can, therefore, look forward and prophesy with confidence the appearance of some startling new finishes and effects on metals as newly developed processes are applied with its aid.



## REFRIGERATOR CABINETS FLUORESCENT LAMP FITTINGS

FILING CABINETS CLOTHING LOCKERS

GUILLOTINING STOVE ENAMELLING

SPOT, OXY and ELECTRIC WELDING

PRESS WORK SPRAY PAINTING

GENERAL

**MANUFACTURING AND DISTRIBUTING CO.**

CORNER OF GEORGE AND VICTORIA STREETS

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PHONES: LA 1177, LA 2486



PRECISION ENGINEERS



SHEET METAL WORKERS



METAL STAMPINGS, ETC.

## PRODUCTION AND PRECISION ENGINEERS SPECIALISTS IN SHEET METAL WORKING AND METAL STAMPING

IN a country as industrially young as Australia it is inevitable that not only should new developments constantly be taking place, but also that, under certain conditions, enterprises should alter the nature of their activities. Such alterations of plans may be necessary because of sudden changes in fashion; because of unforeseen difficulties associated with the securing of the raw materials which enter into production, or because of the arising of unexpected circumstances, circumstances in which the effective conduct of the undertaking as originally planned would be either difficult or impossible.

A CONTINGENCY such as the last-mentioned arose in the case of the General Manufacturing and Distributing Company, of Erskineville, N.S.W., precision engineers, sheet metal workers, and metal stampers. For, in 1940, this Company was inaugurated to engage in the manufacture of vending machines.

### WAR CAUSES CHANGES.

The outbreak of World War II, in September, 1939, however, not only spelt an extreme shortage of the commodities which it had been customary to vend; it also spelt a call to the industrialists of the nation to devote their energies to the production of the armaments of war or of the essential requirements of the civilian population.

To this call, the General Manufacturing and Distributing Company responded with the same enthusiasm as marked the response of the whole of the manufacturers of Australia, switching over their plant to the production of such articles as were calculated to aid the war effort.

### RAPID EXPANSION.

Expansion, meanwhile, was the order of the day. Indeed, the developments taking place necessitated so great an increase in floor space that, between the date of inauguration in April, 1940, and October, 1942, three

different moves were necessary—from William Street, Darlinghurst, to Alexandria; from Alexandria to Darlington; and, finally, to the present location at the corner of George and Victoria Streets, Erskineville, New South Wales.

Here, an up-to-date plant, occupying 15,000 sq. feet of floor space, brought into production a range of sheet metal products as varied as it is comprehensive.

### DIVERSITY OF PRODUCTS.

Major items of the range included anti-aircraft cab mounts for light machine guns; angle iron frames for radar equipment; headlamp masks for army and civilian use; direction and signal equipment; bulk head lights for the Navy; Bren gun parts; certain supplies for the R.A.A.F.; an immense quantity of cases, metal boxes, and cabinets for the housing of radio and electrical equipment; log rolling equipment, pevy handles and cant hooks; tool boxes; clothing cabinets; deod boxes; and travelling trunks.

### PRESENT-DAY ACTIVITIES.

At the present juncture a staff of between sixty and seventy is engaged in precision engineering, sheet metal work, and metal stamping. As a matter of fact, sheet metal components of every description are in regu-

lar production for manufacturers of articles which include sheet metal parts.

Main emphasis is being placed on the manufacture of refrigerator cabinets. Repair and maintenance of all makes of refrigerator cabinets is also expertly executed.

Other important lines being turned out include fluorescent light fittings; filing cabinets; and press work. Services at the disposal of manufacturers include spot, oxy, and electric welding; guillotining; stove enamelling; and spray painting.

### UP-TO-DATE ENAMELLING EQUIPMENT.

A particularly interesting unit recently installed at the works is a conveyor which dips the article in enamel, de-tears it, and dries it by the infra-red process. The speed with which work can be carried out is evident from the fact that the conveyor delivers to the operator at the rate of 1,000 articles per hour. This equipment is increasing the production of articles from 2 in. to 12 in. in diameter, such as toys, film spools, etc.

This modern piece of equipment may be said to typify the modernity which characterises every department of production at the plant of the General Manufacturing and Distributing Company.



Wherever

## *Quiet Operation*

plus

## *Trouble-Free Performance*

is demanded . . .

Australia's leading business organisations  
specify . . .

**\*Airspeed**

VENTILATION EQUIPMENT

Here is a simple and efficient answer to your ventilation problems: the installation of the Airspeed Ventilation Units applicable to your premises.

Throughout Australia Airspeed has provided equipment to eliminate all manner of ventilation worries. In premises ranging from departmental stores to foundries, from churches to steel mills, from dance halls to executive offices, Airspeed units are providing quiet, efficient, trouble-free service.

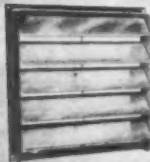
Airspeed equipment includes a full range of Air Circulators, Exhausters, and the "Mancooler" Heavy Industrial Fan. Install the Airspeed Air Circulators and Exhausters applicable to your premises, and ensure all-the-year-round comfort for your patrons and staff.

For qualified advice contact the Airspeed Advisory Service—there is no charge or obligation.

### **BRYANT BROS. PTY. LTD.**

Herbert Street, St. Leonards, New South Wales. Tel: XF1094

Compo Road, Salisbury, Queensland. Tel: JY 5715







# PLANNED VENTILATION

## "AIRSPEED" ADVISORY SERVICE

THE application of propeller fans to ventilation, product drying and cooling problems, is no longer a hit or miss proposition. It is now possible to work to a plan when installing fans for ventilating any area from the size of an individual office to the largest factory in the land.

Fans are now manufactured to perform a definite task, one for a quiet operation, one for a large displacement, moving air more than 100 feet from the fan, another to disperse fumes and foul air, while still another is designed to boost production by speeding the drying process, or for cooling operatives, materials or machines.

As may be well imagined, the application of fans to various types of premises and processes must vary considerably. Each and every building has its own particular peculiarities which must be studied in order to ensure the efficient ventilation of the premises, and at the same time, to eliminate unnecessary expenditure.

When the now well-known Air Circulators were first introduced in the years just prior to the last year, little thought was given to the placing of the fans, and in consequence they failed to give satisfaction. Even to-day, some users are ignorant of how these fans should be used, and place them at the hot end of rooms, near heat generating machinery, near kitchens or other areas where fumes and objectionable odours are created, thus broadcasting discomfort and pollution.

It was facts such as these that prompted Bryant Bros. Pty. Ltd. to inaugurate a service to the electrical trade, and to prospective buyers of ventilation equipment. This service is designed to ensure maximum efficiency for every installation, providing the plan as laid down is adhered to.

This planning and advisory service has, since its inception, been responsible for the installation of various units of Airspeed Ven-

tilation Equipment in places as far apart as Hobart and Darwin, and in cities and towns throughout Australasia. It is a service which is used and appreciated by many leading business organisations, and the plans submitted, plus the consistently high standard of Airspeed equipment, have invariably given complete satisfaction.

The types of organisations using Airspeed Ventilation units are widespread, and some idea of the variety may be gained when one realises that Airspeed fans are being used in the following, as well as many other organisations, banks, brick and tile works, cafes and milk bars, churches, clothing factories, clubs and halls, dry cleaning establishments and laundries, fibro plaster and fibro asbestos works, hotels, hospitals, cold storage works, offices, retail and wholesale stores, schools, tanneries, steel and heavy industries, etc.

Wherever possible, the Airspeed Advisory Service call personally at the premises of the prospective buyer to advise as to the correct type of fan for the installation, this being at present possible in Sydney and Brisbane, where the Company has technical staff, and in Adelaide where direct representation is in the hands of Messrs. Topp and Farmer.

To make a satisfactory recommendation for installation outside these areas, it is essential that certain details be obtained from the potential user. As has been stated in an earlier paragraph, each and every application has its own characteristics, and these must be given due consideration. Two buildings may be identical in design, yet the internal fittings and aspect will mean a wide variation in the layout of ventilation units.

Airspeed have made many effective recommendations for the installation and positioning of equipment in all parts of Australia, and in many cases this has been done by correspondence after first receiving a rough sketch plan giving the following details: Openings, such as doors and windows; the aspect of the

buildings; details of surroundings, such as passages, other rooms, private walks or yards, public roads which abutt the area under consideration; nature of materials used in the construction of the building; and the position of heat generating equipment, if any.

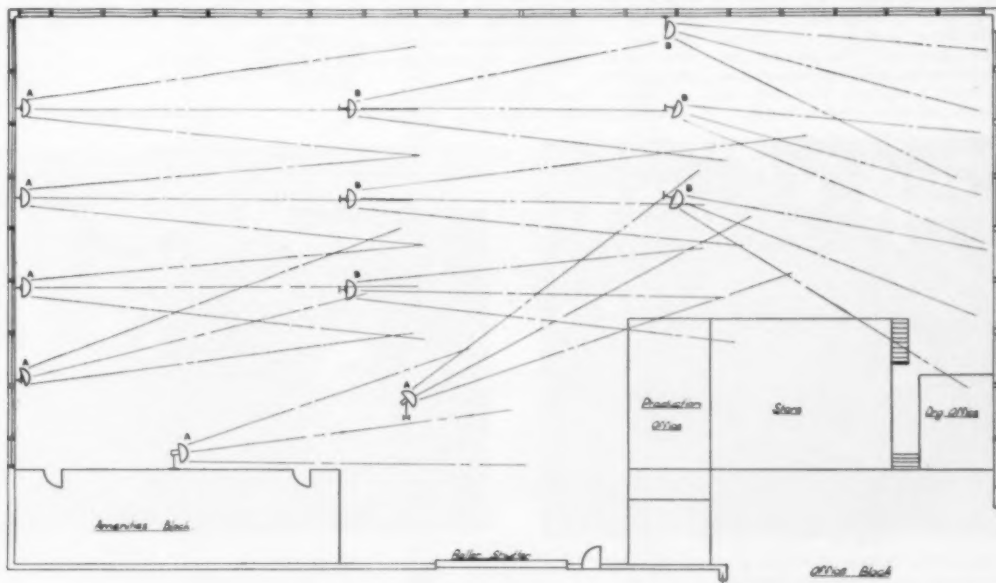
From these details it is then possible to formulate a plan for effectively ventilating the building, and this plan, plus the use of Airspeed Air Circulators and Exhausters, points the way to inexpensive and efficient ventilation for all sizes and types of premises.

A factor which has had considerable bearing on the success of the Airspeed Advisory Service, is that Airspeed manufacture the largest range of propeller fans available in Australia, and provide a suitable unit for every application.

Airspeed manufactures six different models of the popular Airspeed Air Circulators—standard, adjustable stem, wall-mount, short stem, suspension, and a double headed unit—and each model is available with either 24 in. or 30 in. blades and fixed speed or variable speed controls. This wide range of models provides a choice of units to suit any application, and to further broaden this field a wide variety of motors is kept in stock to allow for variations in current, phase, etc.

In the Exhauster field, Airspeed once again offers a wide choice of models which include both standard square and round direct drive models, and the Airspeed "Drum" Exhauster, which is a vee belt driven fan with the motor mounted on an adjustable platform attached to the drum. In each case, with the exception of the round Exhauster, which is only available with 16 in. and 20 in. blades, a range of four sizes is manufactured, these being 16 in., 20 in., 24 in., and 30 in. blade diameters. The units are manufactured from steel and designed to facilitate easy mounting either by welding or bolting through conveniently placed holes on the flange or face of

(Continued on page 284)





# AMONG THE LEADERS IN ELECTRICAL ACCESSORIES

Gerard Industries Ltd. Manufacturers of "Clipsal" Products

AUSTRALIA can be justly proud of its very virile electrical industry. To-day electricity is available in most centres throughout the Commonwealth, and in fact there are very few homes which are not serviced by this utility. This has been a tremendous undertaking spread over many years, and even now there is still an enormous amount of work to be done. The reticulation of electricity throughout the Commonwealth of Australia has required, and still requires, a tremendous amount of electrical equipment both large and small.

AS is the case with many things, the importance of electrical equipment cannot be judged by its size. Electrical accessories, as they are termed, are outstanding examples of this. They are small in appearance yet do a tremendous amount of work, and without them the growth of electricity would not be possible. Under the heading of electrical accessories are such products as switches, sockets, plug tops, ceiling roses, joint boxes, conduit fittings and other similar products. The manufacture of these products is highly technical and extremely exacting. One of the largest Australian manufacturers of products of this type is Gerard Industries Limited, of South Australia.

Mr. A. E. Gerard was the founder in 1907 of this organisation—then known as Gerard and Goodman Limited—when it was commenced in a very small way as a firm of electrical merchants. The first premises were in the basement of a cycle store. In 1909, the premises were transferred to Twin Street, in Adelaide, and within another year to Pirie Street. The enterprise continued to expand, and it was in 1920 that the manufacture of electrical fittings was commenced at what is now the old Blind School at North Adelaide, with a floor space of only 1,000 square feet.

It was here that one-piece grip conduit fittings were manufactured from sheet steel. Prior to this, Australian electrical contractors had to use imported cast malleable fittings which were extremely expensive, and the introduction of this new fitting to the Australian market was greatly appreciated. In 1923, the factory was again transferred, this time to the rear of the Gerard and Goodman Limited Warehouse in Synagogue Place. At this time the factory floor area was approximately 5,000 square feet. The range of products was expanded to take in all sizes of  $\frac{1}{4}$  in. to 2 in. Elbows, Couplings, Tees, and also Junction Boxes and other conduit fittings.

## GROWING RANGE OF MOULDED ACCESSORIES.

It was in 1931 that probably the most interesting and far-reaching stage in the growth of this Company was reached, for it was then that plastics began to make a name for themselves, and Gerard Industries Limited quickly realised the advantages of this material over those previously used by the manufacturers of electrical accessories and soon installed a plastic moulding plant for the manufacture of the factory's growing range of electrical accessories.

Up until this time, the manufacturing section of this enterprise had been operating under the name of Gerard and Goodman Limited, which Company is one of the leading electrical wholesalers in Adelaide to-day. However, in 1931, the manufacturing business was separated and became known as Gerard Electrical Manufacturers Pty. Limited, which has since been changed from that name to the one which now remains, Gerard Industries Limited.

Prior to this, in 1924, Mr. W. G. Gerard had joined the business and was controlling, as he still does, the manufacturing of the range of "Clipsal" electrical accessories. It was Mr. Geoff. Gerard who designed a small flush switch. This switch was one of simple construction and proved extremely popular in the trade, and it was this product, together with many others of outstanding construction, that have placed the name of Gerard Industries Limited, manufacturers of "Clipsal" electrical accessories, among the leaders of the huge electrical industry which is Australia's. First samples of the switch designed by Mr. Geoff. Gerard, together with the first ceiling switch manufactured by the Company, were sold, together with English rights, to one of England's leading accessories manufacturers from whom extremely complimentary letters were received.

## NEW FACTORY BUILDINGS.

Further growth of this virile business made

it necessary to provide additional floor space. Consequently, in 1936 a modern building was erected at Bowden, South Australia, with a floor space of 25,000 square feet. In 1943 this area was doubled. The continued growth of Gerard Industries Limited has again made it necessary for further additions to be made and at time of writing a further building of 10,000 square feet is in the course of erection and should shortly be ready for occupation. With this building the Company will then have a total floor space of 60,000 square feet.

The new building has been designed to house the plastic moulding department which will be the largest compression moulding plant in South Australia, comprising over 50 presses ranging from 15 to 100 ton capacity! The Company has installed, in addition to the conventional hydraulic presses, semi-automatic and fully automatic presses, and a set of presses for Transfer Moulding. Specialised equipment for the manufacture of small metal parts has also been installed over the years, and it can be said to-day that Gerard Industries Limited have operating some of the most modern and up-to-date machinery of its type which is to be found in Australia.

## TOOL DESIGNING.

The Directors of Gerard Industries Limited have always realised that for the successful manufacture of products made by the Company, emphasis must be made on tool designing, and for years it has been the policy of the Company to specialise in this sphere. Consequently, a well-equipped toolroom with the best of plant available, together with first-class tradesmen form the nucleus of the organisation. Continuous supervision by the design department is exercised over the tradesmen, and a continual check on tolerances in various tools is made, and any corrections necessary are made in order that the standard of the products produced cannot deteriorate at any stage. This has been the basis for production

(Continued on page 284)



One of the battery of moulding presses used by Gerard Industries Ltd.



Metal press line at the plant of Gerard Industries Ltd.



## MODERN BUILDINGS DEMAND

*Trouble-free  
installations*

# CLIPSAL

## ELECTRICAL ACCESSORIES



Cord Grip Holder.  
No. 501.



Silent Flush Switch.  
No. 333.



Angle Batten Holder.  
No. 540.



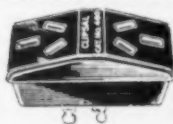
Cord Extension Socket  
(Industrial Type).  
No. 436.



Flush Inlet Socket.  
No. 435.



Batten Holder No. 502.



Dual Plug Adaptors.  
2 and 3-pin.  
No. 462-460.



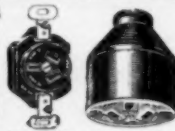
Flush Switches—  
1-way No. 310.  
2-way No. 311.



10 amp. Single-Pole  
Surface Switches.  
No. 380.



Plug Sockets, 2 and 3-  
pin. Nos. 402 and 412.



Flush Plug Socket, 2  
and 3-pin. Nos. 405-  
415. Cord Extension  
Socket, 3-pin. No. 434.



Ceiling Switch, 1 and  
2-way.



Grip Elbow Coupling  
and Tee.  $\frac{1}{8}$  to 2 inch.



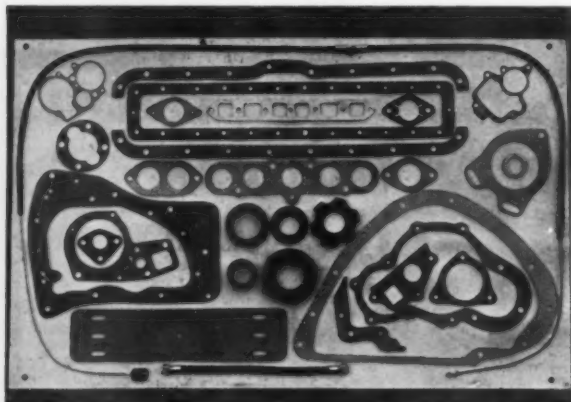
Claw-type Earth Clips.  
 $\frac{1}{8}$  inch-2 inch.

In nine out of ten homes, offices and factories in Australia are to be found CLIPSAL Electrical Accessories. These Australian-made products by Gerard Industries owe their mass popularity to their unfailing reliability, economy and proven design. There is a CLIPSAL accessory for every purpose. You will be wise to follow the lead of experienced electrical contractors and insist on CLIPSAL products.

**GERARD INDUSTRIES  
LIMITED**

PARK TERRACE, BOWDEN, SOUTH AUST.





## C. H. ROBERTSON GASKET MANUFACTURER

All classes of Gaskets  
manufactured to  
specifications from best  
quality materials.

**186-188 Parramatta Road  
CAMPERDOWN, N.S.W.**

PHONE: LA 2050

### AMONG THE LEADERS IN ELECTRICAL ACCESSORIES

(Continued from page 282)

from the day on which the Company first commenced manufacture in order that only first quality products be produced. This policy is the correct one, as the increasing popularity of "Clipsal" products signifies.

During the war, large quantities of switches, lampholders, plug tops, conduit fittings and other products were supplied to the services and in addition a range of special equipment for use in aircraft was manufactured by the Company.

### LARGE OVERSEAS ENQUIRIES.

There are large overseas enquiries for "Clipsal" products, and representatives have been appointed in India, Palestine, Ceylon, South Africa, Egypt, Malaya, and New Zealand, but, unfortunately, the Australian demand for these products has been such that up till now exports have been precluded. It is to be hoped, however, that with the increasing manufacturing capacity and the consequent possibility of overcoming the Australian demand for their products in the not too distant future, Gerard Industries Limited will be able to create a large export business to the advantage of not only themselves but to the whole of Australia.

### OIL HYDRAULIC EQUIPMENT (Industrial Service Engineers)

(Continued from page 224)

to metal fits of the moving parts. This has eliminated leather packings and other soft sealing equipment with all their attendant service difficulties.

Moreover, the use of a high quality mineral lubricating oil as the hydraulic medium has provided excellent lubrication for all moving parts, with the consequence that modern oil hydraulic equipment has very long life and is free from all service worries. The flexibility of the equipment offering provides a means of making self-contained hydraulic units for each machine, obviating the expensive and cumbersome accumulator and hydraulic mains systems.

### ENQUIRIES.

Industrial Service Engineers Pty. Ltd. welcome any enquiries in respect to possible application of oil hydraulic actuation, and

will be happy to give their advice based on the outstanding experience of their principals, Vickers Incorporated, of Detroit, U.S.A.

### INDUSTRIAL DEVELOPMENT IN VICTORIA

(Continued from page 71)

new industries. These visitors are also supplied with information concerning the resources of the districts.

The service which the Victorian Government has been able to give overseas industrialists has helped materially to attract industries here.

I am convinced, following discussion which I had with overseas executives when I was in London, that there is a desire on the part of many captains of industry in the old country to spread their activities, and to establish themselves closer to the source of raw materials.

Overseas companies that have started here within the past two years have quickly consolidated their position, and adapted themselves with considerable skill to Australian conditions.

Despite the fuel problem, the growth of industry in Victoria has been spectacular. In 1912, when registration of all factories in this State came into existence, there were 7,750 factories in operation. To-day the number is in the vicinity of 15,000.

So within a short time from now it is reasonable to expect, on the present rate of increase and other factors that will operate, that Victoria will pass the 20,000 mark.

The compactness of this State is a distinct advantage to manufacturers, especially in cases where they are anxious to have a location outside the metropolitan area.

Over the years we have made great strides as a manufacturing State, and the future looks particularly bright.

All we need now is the fullest co-operation between employer and employee, a continuance of the Government's developmental plans, and a full scale effort by primary and secondary industries to overtake shortages of essential goods and materials.

In other words, it rests with the people of Victoria to make this State what it is destined to be—the most prosperous in all Australia. It is for them to hasten that happy day.

### DRUM RECOVERY ELIMINATES BOTTLENECKS

(Continued from page 223)

and dirty, often to such an extent that they would appear completely unsuitable for further service in industry. Within a short time these are on their way through the thorough processing and recovering routines which restore to them their original shapes, strength and usefulness. Even the most minute leaks are located by meticulous testing and these are effectively sealed. Internal "scrubbing" removes residues, rust, corrosion and lingering fumes, while vacuum pumps remove water and dry-heat removes moisture. Finally, the drums are spray-painted to any colour or colours specified. The restored drums are as serviceable in every way as they were when new.

The extent of the company's service to industry in particular and the community in general can be gauged from the fact that thousands of otherwise useless drums arrive at and thousands of fully recovered drums leave the plants at Chippendale and Matraville daily to be recommissioned for transporting or storing the products and materials of industry. It may reasonably be asserted that but for the enterprise of this progressive private undertaking, many thousands of gallons of petrol and oils as well as considerable quantities of other essentials would not reach key consumers with anything like the same degree of convenience, despatch and efficiency.

### PLANNED VENTILATION

(Continued from page 280)

the fan. Once again a wide variety of motors is always available.

To complete the present range and provide a fan particularly suitable for work in heavy industry, and for cooling men, machines and products, Airspeed produced the well-known "Mobile Mancooler." This heavy duty air circulator has received a ready welcome throughout Australia's heavy industries, as well as from manufacturers who had drying and cooling problems, and has been responsible for increased output in a number of high priority works programmes.

This, then, is the range of Airspeed equipment which makes it possible for the Airspeed Advisory Service to plan and provide efficient ventilation in all types of premises. Each item is guaranteed for twelve months, and satisfied users throughout Australia bear witness to the service rendered by Airspeed units.

The Airspeed Advisory Service is available upon request to the Airspeed Division of Bryant Bros. Pty. Ltd. There is no charge or obligation to the inquirer.





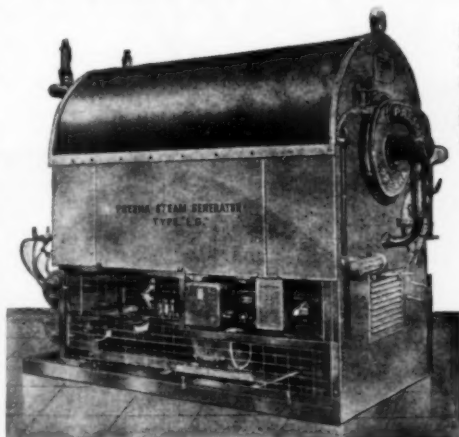
## Modernise your Steam Plant

install a

# PRESHA STEAM GENERATOR

The last word in steam generation. Cheaper than a steam boiler to install. Highest economy & efficiency guaranteed 80%. Entirely automatic in operation. No constant attention. A full head of steam in five minutes from cold. Can be installed on any floor upstairs or downstairs. No foundations. No brick-work. No high chimney. Can be close to load in factory. Only one third weight and size of boiler.

**PRESHA STEAM GENERATORS** are fitted with "Presha" Patent Fully Modulating Low Pressure Fuel oil burner. Can operate on Diesel, Furnace or Bunker oil.



Steam Pressure Automatically Controlled burner adjusts itself to supply the heat required to give the steam you want.

**Absolutely No Explosion danger. PRESHA STEAM GENERATORS ARE PERFECTLY SAFE.**

Over 300 Presha automatically controlled steam generators installed and operating in Australia.

**ASK ANY USER FOR HIS OPINION.**

Presha generators covered by world patents, wholly designed and manufactured in Australia by Australian engineers using Australian material and equipment.

**ASK FOR FURTHER PARTICULARS — WE WILL PROVIDE LISTS OF USERS.**

## PRESHA ENGINEERING CO. PTY. LTD.

PATENTEES & SOLE AUSTRALIAN MANUFACTURERS

City Road, Sth. Melbourne, Victoria.	Botany Road, Waterloo, Sydney, New South Wales.	Gibson Street, Bowden, Adelaide, South Australia.	Charlotte Street, Brisbane, Queensland.
Wellington Street	Perth	West Australia.	Montreal Street
Overseas	Representation: Presha Overseas Corporation Pty. Ltd., 1 Bent St., Sydney.		Christchurch
			New Zealand.

# MODERN STEAM POWER GENERATION

## AN AUSTRALIAN DEVELOPMENT

A FEW years ago a well-known Melbourne engineer retired from the management of an extensive business, which he had established fifty years previously, to devote himself to the development of an idea which had interested him for many years. One or two friends who shared his enthusiasm joined him in this project, and several years were spent in research experiment and testing—the result being the now widely known "Presha" Steam Generator.

THE first "Presha" unit produced was installed in a Melbourne food factory in 1945, and this generator was such a success, and so impressed visitors from all over Victoria and other States, that the demand for similar plants far exceeded expectations. To cope with this demand a Company was formed—Presha Engineering Co. Pty. Ltd.—and larger factory premises were occupied in South Melbourne.

With a staff of about fifty employees in the factory, the Generators were manufactured and installed in Victoria and other States of the Commonwealth until, to cope with the still growing demand, separate Companies were formed and factories established at Waterloo, Sydney, N.S.W., and Bowden, Adelaide, S.A. At present further factories are being opened for the manufacture of the units in Brisbane and Perth.

There are now over 300 "Presha" Steam Generators operating in Australia, and pro-

vision is being made for their export overseas. To supply this increasing demand, Presha Overseas Corporation Pty. Ltd., the head office of which is in Sydney, has been formed to take charge of overseas business. A number of generators are also operating in New Zealand, where the demand is catered for by Presha Distributors Ltd.

World patents have been secured for the original plant, and for the many exclusive improvements which have been made since its installation. The Company claims that the "Presha" Steam Generator is the cheapest steam plant to install, and is more economical, efficient, reliable and safer than any other steam plant known.

With a guaranteed efficiency of 80 per cent., they are particularly safe to operate—their design and construction eliminating all danger of explosion. This, with their automatic operation, reduces the need for atten-

tion to a minimum—an important feature in factory installations.

Those interested in steam generation for any purpose would do well to call and see these Generators in the course of construction or in operation under full load. Perhaps the best testimonial to their efficiency is the number of clients who originally installed one plant and who, in the light of growing demands for steam brought about by subsequent expansion, have installed up to eight additional plants.

"Presha" Steam Generators will provide any type of steam power, at any pressure within commercial limits, and are designed to operate on furnace or bunker oil. Further details of these installations, and of the efficiency and economy of this form of fuel, are available on application to Presha Engineering Co. Pty. Ltd., 290 City Road, South Melbourne, 171 Botany Road, Waterloo, N.S.W., or 34 Twin Street, Adelaide, S.A.



# Story behind



**"GLOBE" QUALITY** is recognised by discriminating buyers the world over.

The cloth is carefully examined by expert inspectors before leaving the Mills. These men make sure that every yard is up to standard — Globe's high standard.



OFFICE AND WEAVING MILLS:

**BARCLAY STREET, MARRICKVILLE, N.S.W.**



# Globe Worsted



Australian wool from the  finest "clips" is carefully sorted and classified to type. Carding and combing prepares the



wool for spinning. Every process is carefully supervised by experts with



lengthy experience. The yarn is warped and woven by craftsmen; the cloth is then scoured, dyed and finished.



Behind every suit length of "Globe"

Worsted is the skill of the technician,



trained to the highest Industry.



traditions of the Textile

**GLOBE WORSTED  
MILLS PTY. LTD.**



SPINNING MILLS:

**GORDON STREET, MARRICKVILLE, N.S.W.**



# AUTOMOTIVE ★ EFFICIENCY

UNIQUE CONTRIBUTION BY R.V.B. ENGINEERING PRODUCTS PTY. LTD.,  
OF SPOTSWOOD, VICTORIA.

With secondary industry making enormous strides in Australia during the war, and with the healthy competition and expansion which has occurred in private enterprise, all branches of industrial activity are paying special attention to increasing plant efficiency. Everywhere outmoded methods are being replaced by faster, more mechanised and more efficient techniques to advance the overall production rate.

Hand in hand with this increased productivity, however, has come the need for stricter attention to economy. Major sources of manufactured articles, which were sealed off during the war, have now re-entered the commercial field, and Australian industry is faced with the prospect of reducing costs in the face of rising wages and steadily advancing prices of raw materials.

**R.V.B. ENGINEERING PRODUCTS PTY. LTD.**, of 144-150 Hall Street, Spotswood, Victoria, have adopted a twofold approach to this problem:—

Firstly, by specialising in the production of equipment designed to increase the efficiency of automotive transport—an integral part of every major industry—they have been able to make a particularly valuable and timely contribution to the general economy.

Secondly, through years of technical research into improved production methods—coupled with the development of only scientifically designed products—they have been able to market these at commonsense prices, which has led to their wide-scale distribution

of the leading manufacturers of the world both in regard to quality and price.

While motor horns of the "Aertone" magnetic coil type were reviewed fully in the last edition of "The Australasian Manufacturer Annual," an additional tribute to their efficiency is their adoption as original equipment for all General Motors Holden cars for standard and de-luxe models.

Available singly or in matched pairs in under-bonnet or external weather-proof models, these horns deliver a commanding penetrating note without frightening or arousing the resentment of pedestrians or other motorists. Additional warning devices made in indoor and outdoor weather-proof models



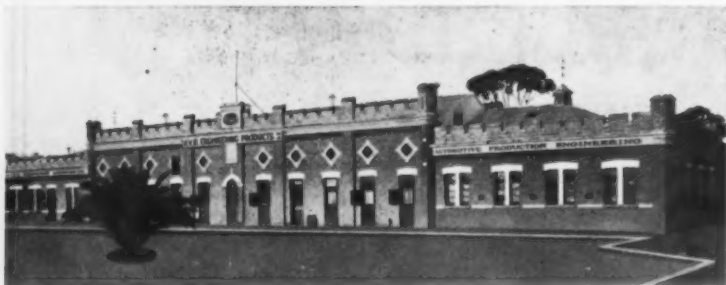
Mr. R. V. BUTLER, Founder and Managing Director of R.V.B. Engineering Products Pty. Ltd.

demonstrated by the recent release of the B710 Cylinder Compression Tester. Designed to indicate variations in cylinder compression when inserted in place of a spark plug, this instrument is of particular value to fleet-owners for diagnosing valve or piston ring leakages without the need for costly and time-consuming dismantlement.

In addition to this revolutionary instrument, for which patent has been applied for, two other productions are under way of which details have not yet been released. Providing the basis for two further patent applications, details of these productions are awaited with interest—both in Australia and abroad.

One thing is certain, however. By continuing their policy of distributing only through recognised agents and reputable wholesalers, R.V.B. Engineering Products Pty. Ltd. have ensured that future productions will be received with the same confidence and faith that have been won in the past.

There is no substitute for quality, and when this excellence of design and exactness of finish are allied with competitive prices by world standards, support must follow. All enquiries should be made through local wholesalers or distributors or, failing that, by applying to R.V.B. Engineering Products Pty. Ltd., 144-150 Hall Street, Spotswood, W.14, Victoria, for catalogue and technical data as well as sales matter pertaining to the product.



Portion of the Company's premises at Spotswood, Victoria.

within the Commonwealth and to many countries throughout the world.

This ever-increasing demand has, at the same time, enabled R.V.B. Engineering Products Pty. Ltd., which was founded as recently as 1935, to expand their production capacity at a rate which has almost outstripped the present factory accommodation.

With plans afoot to double the existing factory area as soon as building restrictions permit, this Company—under the forceful and enterprising leadership of Mr. R. V. Butler, its founder and present Managing Director—has mapped out a policy of carefully considered expansion designed to cope with the steadily growing overseas and local market potential.

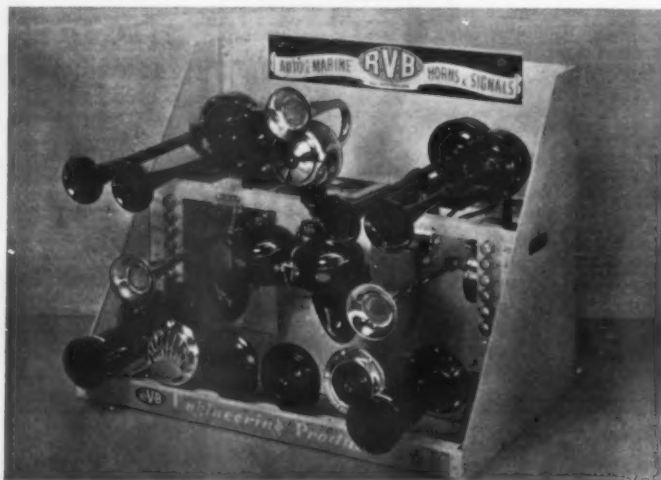
With strict control exercised in every department of the R.V.B. factory, whether in manufacture of tyre gauges, motor horns, industrial warning signals, or the revolutionary new R.V.B. cylinder compression tester, every product is subject to intensive inspection and supervision.

Horns, sirens and warning signals are tuned to the exact frequency required, while tyre gauges are tested against precision master instruments guaranteeing their accuracy to within 1/16 in. Employment of only the best raw materials, machined by skilled operatives working to exacting limits, has set a standard of precision which assures the user of continued accuracy of gauges under all conditions.

Bearing an unconditional guarantee against faulty workmanship, R.V.B. products, besides dominating the Australian market, have thus found ready markets in New Zealand, Union of South Africa, Rhodesia, Kenya Colony, India, Pakistan, Ceylon, Pacific Islands, and the Middle East—in which they continue to more than hold their own with the products

include industrial buzzers and sirens, as well as the highly efficient "Hurricane" range of marine and fire sirens.

That R.V.B. have not been content to rest on their justly earned laurels, however, is



Portable working display unit of R.V.B. Motor Horns for demonstration of tone. Exhibited at shows and expositions in a number of countries, and supplied to 70 distributors throughout Australia, this panel has never failed to arouse interest.





IN ALL CIRCLES...

From Automotive to Industrial



Quality  
PRODUCTS

Hold an Established Leadership!



Years of specialisation in the manufacture of Tyre Gauges, Automotive Horns and Warning Signals has won for "R.V.B." a reputation for sustained high quality, reliability and long service life, not only in Australia but in many overseas countries. To-day, as always, R.V.B. products are quality products.

 <p>H.F.201.202. Scroll type Aertone matched pair. Richness of tone. Distinctive styling. Selected by car manufacturers as standard equipment.</p> <p>CAR HORNS</p>	 <p>No. 2. Diaphragm Type Horn with Electrical Vibrator mechanism. Chrome plated grille.</p>  <p>No. 5. Projector type for under-bonnet Engine Mounting. Finished in glossy black enamel.</p> <p>CAR HORNS</p>	 <p>H.F.209A. Aertone marine signals. Bent trumpet type. All brass—non-corrosive.</p>  <p>H.F.209. Aertone marine signal. Straight trumpet type. All brass—non-corrosive.</p> <p>ELECTRIC MARINE SIGNALS</p>	 <p>"Z" and "Y." Model "Z." non-weatherproof, for indoor use. Model "Y." weatherproof, for outdoor use.</p>  <p>"X." Single scroll projector. Non-weatherproof. Ideal for mounting in a limited space.</p> <p>ELECTRIC WARNING SIGNALS A.C. or D.C.</p>
 <p>J.I. No. 1 No. 2</p> <p>Designed on the direct action principle. Easy-to-read figures. Precision built. 14 models.</p> <p>TYRE GAUGES—Private Use</p>	 <p>No. 10 (top right) No. 8 (bottom right)</p> <p>There is a Tyre Pressure Gauge for every purpose, including models for dual wheels. All scientific instruments carefully tested against Standard Master Gauges.</p> <p>TYRE GAUGES—Truck</p>	 <p>A.I. Chuck Air Line Coupling Tractor Tyre Gauge</p> <p>Model T.12. Checks air and air-liquid filled tyre pressures up to 50 lbs. sq. in. Guaranteed accurate and reliable. Non-corrosive.</p> <p>TRACTOR TYRE GAUGE AND AIRLINE FITTINGS</p>	 <p>Model 11A. Fitted with dual head. Checks, inflates, deflates. Fits all wheels on trucks, buses, vans, cars, etc. Calibrated from 0-120 lbs.</p> <p>SERVICE STATION GAUGE</p>

R.V.B. ENGINEERING PRODUCTS PTY. LTD., Spotswood, Melbourne

Representatives Inner-States:

Queensland—F. J. Gifford Pty. Ltd., 228-4 Queen Street, Brisbane. (P.O. Box 2400.)

N.S.W.—L. M. Blanton & Co., 127 Pitt Street, Sydney.

South Aust.—Messrs. Parley & Pugh, 127 Flinders Street, Adelaide. (P.O. Box 6282.)

West Aust.—Mr. D. B. Sharp, Occidental House, St. George's Terrace, Perth.

Overseas Agents: Messrs. Ransley & McEwen (A.S.I.A.) Pty. Ltd., 107 Sussex Street, Melbourne.

Overseas Representatives: New Zealand—Ransley & Co. Pty. Ltd., Colonial Mutual Building, Customhouse Quay, Wellington, N.Z. Africa—Messrs. Forester Pty. Ltd., 204 Airs Building, Cap. Albert and Bank Street, Johannesburg, South Africa. (P.O. Box 120.) India—Ransley & Co. Pty. Ltd., Overseas from London, Bombay, Ceylon—The Colonial Motor & Engineering Co. Ltd., 297 Union Place, Colombo. (P.O. Box 39.) Fiji—Universal Motor Parts, Victoria Parade, Suva. (P.O. Box 24.)



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**ENGINEERING**

SELF-PRIMING PUMPS

CHEMICALS

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FOOD PROCESSING

PEST EXTERMINATION

GRAVEL

SAND

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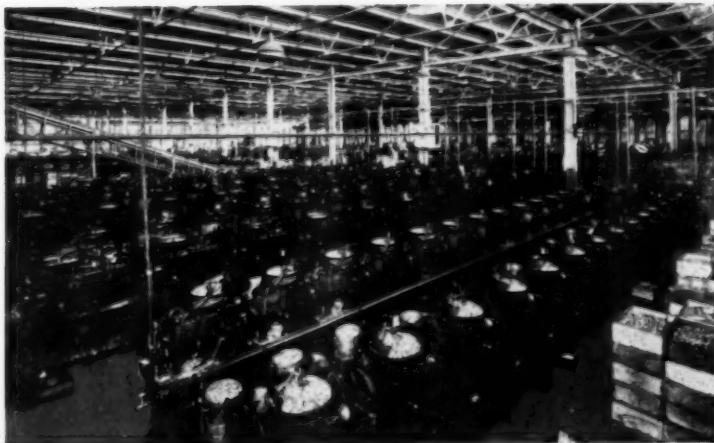
Please address all overseas  
enquiries to our  
EXPORT AGENTS  
Frank Wiggery & Co.  
3A Winfield Building  
446 Flinders Lane  
Melbourne, C.I., Vic.  
Phone: MB 1214



# NETTLEFOLDS



*The Standard  
of Quality*



*View of Screw Works at Sunshine, Victoria.*



**NETTLEFOLDS Pty. Ltd., Sunshine, Victoria**

THE AUSTRALASIAN



MANUFACTURER

## Production and Precision

GO HAND IN HAND WITH **P & N** TOOLS ON THE JOB . . .



**P & N**

TOOLS TO DO  
THE JOB

Whether you are out for production or for precision—or for both—you will do better with P & N tools on the job. Checked right at every stage—design, material, heat treatment, manufacture.

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LET US QUOTE YOU FOR:

*Repetition turned  
and screwed parts  
in all materials.*

*Capstan lathe  
capacity up to 2"  
dia.*

*Automatic lathe  
capacity up to 1½"  
dia.*



**Spur Gears**  
UP TO 8" DIAMETER  
6 TO 100 D.P.

**Worm Wheels  
Helical Gears**  
UP TO 5" DIAMETER  
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UP TO 3" DIAMETER  
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16 TO 100 D.P.  
SINGLE AND MULTIPLE  
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## ALPHA ENGINEERING CO. PTY. LTD.

Works: 62-68 Layton Street, CAMPERDOWN, N.S.W.  
Phones: LA 3256-7.

City Office: 30 Grosvenor Street, SYDNEY.  
Phones: BU 2607, BW 7397.

Cables, Telegrams: "STEELTRAIL," Melbourne.

**FRANKLIN & ANDERSON**  
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10 Cwt. to 50 Tons Capacity

*Built and Distributed by:—*

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ALL ROAD AND FARM TRAILER EQUIPMENT

AGRICULTURAL TRACTOR WHEELS FOR ALL  
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★ **PRESSURE GAUGES**  
 ★ **DIAL THERMOMETERS**  
 ★ **INDUSTRIAL INSTRUMENTS**



MERCURY-IN-STEEL  
DIAL THERMOMETER



ELECTRIC CONTACT  
PRESSURE INDICATOR

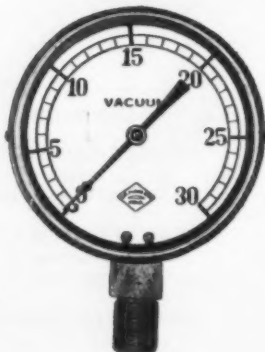


DIAPHRAGM VALVES COMPLETE  
WITH AIR OPERATED PRESSURE  
CONTROLLER AND GAUGES

STANDARD PRESSURE GAUGE  
CAST BRASS (on right)



HYDRAULIC GAUGE



VACUUM GAUGE PRESSED BRASS CASE  
(on right)

**J. A. FLOYD & CO. PTY. LTD.**

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594-606 Mt. Alexander Road, Moonee Ponds

**VICTORIA**

Thomas C. Brown and Co. Pty. Ltd., 181 Clarence St., Sydney, N.S.W. and Qld. Representative



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METAL SPINNERS  
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SHEET METAL WORKERS  
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COLD IMPACTERS

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**Tool and Die Makers, Nickel Platers, Silver Platers,  
Copper Platers, Oxidising, Electro Tinning, etc., Metal  
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*Manufacturers of*

**Ball Floats, Shower Heads, Cold Impacted Radio  
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**INSIST ON**

# "PARFREY" RIGID PLASTIC WATER PIPING

MANUFACTURED BY

**PARFREY PLASTICS PTY. LTD.****EAST MELBOURNE**

DISTRIBUTORS—C.I.A. ASSOCIATED AGENCIES

484 VICTORIA PARADE

EAST MELBOURNE, VIC.

PHONE: JA 3794

## NOTABLE CONTRIBUTION TO PRIMARY PRODUCTION PLASTICS IN THE WATER PIPING FIELD

**A** RAPIDLY increasing use of plastics as applied to the problems of the primary producer is due to the enterprise of a Melbourne Company, Parfrey Plastics Pty. Ltd., of 484 Victoria Parade, East Melbourne, which has pioneered in Australia, the development and manufacture on a considerable scale, of a rigid plastic water pipe.

The manufacturers claim unique advantages of plastic over metal piping in:

- (a) **Resistance to corrosion.** ensuring long and effective service, even when piping artesian, or other highly mineralised waters.
- (b) **Ease of installation.** Tough, resilient coils of 300 feet or more require a minimum of outlay in time and money, and call for no special skill in laying underground.
- (c) **Ease of transport.** The light, easily handled coils—approximately one-sixth the weight of a corresponding length of metal pipe—are readily trans-

portable by air, rail, or road, at remarkably low relative cost.

- (d) **Simplicity in connecting.** The manufacturers have developed simple, effective methods of connecting plastic to metal, and plastic to plastic, suitable for

use with standard water pipe fittings.

- (e) **High degree of chemical inertia** of the material of which the piping is fabricated gives special advantages in piping of liquids which normally demand stainless steel pipe as a preventative of taint, en-

pecially in drinking liquids.

"Parfrey" plastic water piping is manufactured in sizes of  $\frac{1}{2}$ , 1, 1 $\frac{1}{2}$  and 1 $\frac{3}{4}$  inch. Quotes for larger sizes are promptly given.

The manufacturers have developed a new technique for close control of pipe sizing, and remarkably close tolerances are observed on overall diameters and wall thicknesses.

As a means of piping agricultural waters, the piping is quickly gaining popularity in all States of the Commonwealth, while in the industrial field it is giving outstanding service in carrying fruit juices, aerated waters, distilled waters, beer, and acids.

Government and semi-government bodies have given approval for its use in a number of their undertakings, notably in big housing schemes at Yallourn and Kiewa, where it will carry water from sub-mains to the houses.

The manufacturers' representatives are C.I.A. Associated Agencies, of 484 Victoria Parade, East Melbourne, C.2., to whom all orders and enquiries should be directed.



Demonstrating lightness of piping. There are 200 feet 1 in. dia. in this bundle, weighing 25 lbs. Piping is also available in continuous coils up to 6,000 feet.



## INDUSTRY HAS USE FOR THESE PRODUCTS

**"LIGHTNING" PRODUCTS DO MORE WORK IN LESS TIME!**

**Lightburn & Co. Limited, Manufacturing Engineers, specialise in the manufacture of builders' plant, automotive equipment, domestic and industrial equipment. Industry to-day has use for all products manufactured by this progressive Company.**

**T**HE first products produced by this Company were a complete range of hydraulic jacks from one to ten-ton capacity. These jacks have earned themselves a reputation for reliability, and have proven so popular that they are used, both as initial and replacement equipment, by the major motor companies operating in Australia to-day.

In most industrial plants, there are many small lifting jobs—such as the transferring of pieces of machinery to a different part of the plant—which cannot be handled conveniently with cranes, but can be handled quite satisfactorily by using a hydraulic lifting jack. Due to the low height of the lifting jacks, they are particularly useful in lifting lathes or smaller machine tools so that rollers can be placed in position under them for further movement.

Another product for material handling is the 5 cwt. pneumatic-tyred steel trailer which has been found most useful for moving light plant and materials.

All industries have a use, one way or another, for a wheelbarrow, and the "Lightning" 3½ c. ft. pneumatic-tyred barrow is ideally suited for use in industry.

The pneumatic-tyred wheels fitted to both trailers and wheelbarrows are also available as separate units. They are manufactured in the size most suitable for industrial use, and as the modern trend is to have all portable equipment mounted on pneumatic tyres in order to make movement far easier and less noisy, these wheels are ideal for replacing steel wheels which have, in the past, been fitted to most portable equipment.

### Big P.M.G. Order

The Company manufactures concrete mixers ranging in size from the hand utility mixer of 1½ c. ft. capacity to the 3½ c. ft. heavy duty model which is power driven.

Every model has a use in industry for internal building and maintenance work.

Factory floors, concrete paths, foundations and drains need repairing from time to time, and the most

economical way to carry out these repairs is to employ Company labour to do the job. "Lightning" mixers are invaluable for this work, as, in addition to saving time and labour, their scientific design ensures a perfect mix which, naturally, adds to the strength of the completed job.

Many industries are finding that with the existing shortage of building

to the P.M.G. Department were so satisfactory that the Department has been supplied with well over 100 during the last 12 months. In total, over 25,000 mixers have been produced by Lightburn & Co. Limited since commencing production in 1945.

### The "Lightning" Automatic Wash-Dry-er

With the trend in industry to-day to

laundered outside at high expense, but the use of a "Lightning" Automatic Wash-Dry-er in the canteens very soon pays for itself by its great saving of time and labour.

The unit features "tumble-type" washing action which is the most efficient method known of washing clothes. The high speed Spin-Dry-er is a most appropriate counterpart to the "tumble-type" washing action of this composite unit which actually washes and dries at the same time.

These machines have been widely accepted and acclaimed throughout every State in Australia. Thousands have found their economical running, the saving on water, and the fact that they cost nothing to install, a determining factor when searching for a first-class washing machine to buy. The "Lightning" Wash-Dry-er is the first washing machine completely designed in Australia, and it incorporates all the worthwhile advantages of washing machine progress over the last ten years.

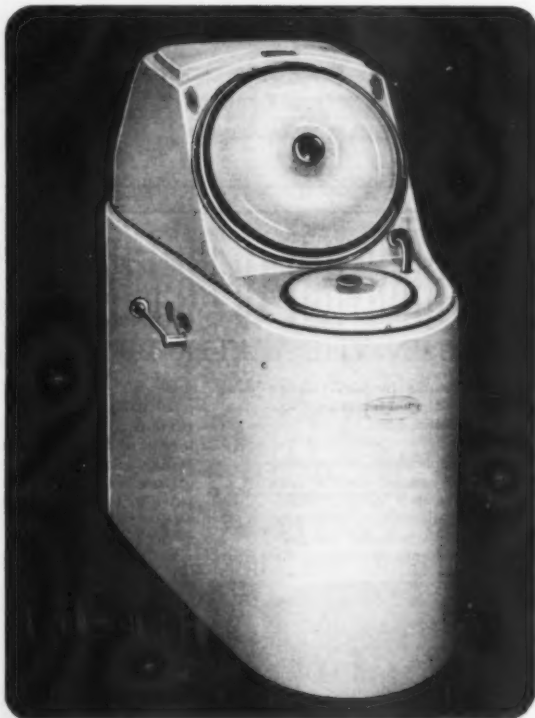
With all "Lightning" products, the manufacturers' aim has been to produce products which will do more work in less time, make work easier for the user, and at all times maintaining a high standard of quality. These aims are the essence, symbol and spirit of the Company.

These factors apply to the "Lightning" products illustrated in the advertisement on the next page, products which incorporate the principles essential to speedy and economical operation.

### SHAREHOLDER-EMPLOYEES

Lightburn & Co. Limited was incorporated in South Australia in 1945. A most satisfactory basis operates with the Company's employees who are encouraged to take up shares in the Company with the result that they rightly view the Company's and their own interest as identical.

The progress that the Company is making is due, in a great measure, to the support of its shareholder-employees, who are known as associates.



The "Lightning" Automatic Wash-Dry-er.

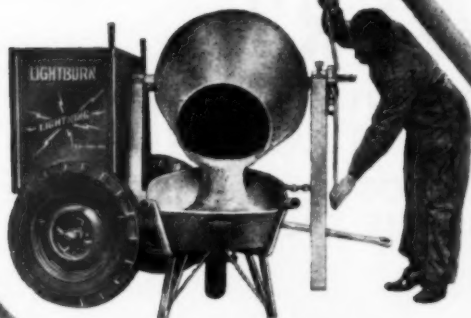
bricks, it is necessary to use concrete bricks to carry out building extensions, and the "Lightning" Brick Mould is designed to produce a well-finished block which is equivalent in size to six ordinary bricks.

The initial 48 3½ c. ft. mixers supplied

provide canteens, the "Lightning" Automatic Wash-Dry-er, as depicted on this page, finds a use in industry in washing and drying tea towels, table cloths and staff uniforms. Some large industries with staff canteens have tea towels, table cloths and uniforms



ANOTHER  
**LIGHTBURN**  
PRODUCT



3 C. FT. POWER PORTABLE  
CONCRETE MIXER



BRICK MOULD



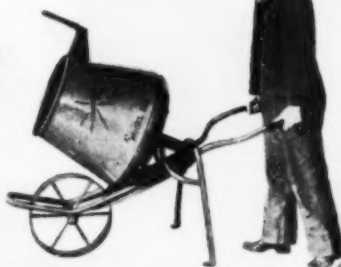
3 C. FT. BARROW



3 C. FT. POWER PORTABLE CONCRETE MIXER



2 C. FT.  
HAND-POWER  
CONCRETE MIXER



1 C. FT. UTILITY MIXER



HYDRAULIC JACKS, 1 TON TO 10 TONS CAPACITY,  
AND BUMPER BAR PASSENGER CAR JACKS



5 CWT. STEEL TRAILER



INDUSTRIAL WHEELS.



REG. TRADE MARK

**LIGHTBURN & CO. LIMITED**

BRISBANE  
B 8314

SYDNEY  
LM 5815

MELBOURNE  
MX 5434

ADELAIDE  
C 6070

PERTH  
BA 2607



# "POWER" PRECISION GRINDING MACHINES

## PAUER & CO.'s PROGRESSIVE PROGRAMME — IMPRESSIVE RANGE OF MACHINE TOOLS

IN this age of slogans, perhaps as apt a one as has yet appeared has recently been happily adopted by Pauer & Co. Pty. Ltd., of North Melbourne, Victoria. "Our Workshop is our Showroom." This is no idle boast of modern advertising, nor is it simply a mere admission of limited facilities for adequate display, but a principle on which a very progressive company has based its policy.

Pauer & Co.'s workshop is, indeed, a showroom in more ways than one. Here the acme of cleanliness, order and colour have been combined to provide Australian industry with an outstanding example of what can be done—

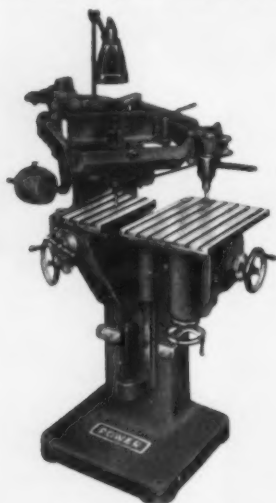
and what Australian workmen in unison with a sympathetic and understanding management enjoy doing.

Anyone who has been privileged to see the machine shop of this young company will agree that here is something worth-while. Clean swept floors, ensuring health and efficient working conditions, green walls with white ceilings giving restfulness to the eyes and maximum light, together with pot plants on brackets around the walls, all go to make this workshop an ideal place for the manufacture of high grade, precision machinery by a contented, willing and co-operative staff.

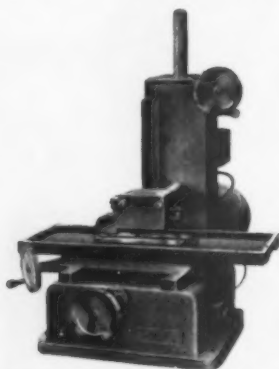
But Pauer & Co.'s workshop is their showroom. Here can be seen in operation most of the machines this company has made. As far as possible, the machinery used throughout the factory is Australian made, and, of course, "Power" precision grinding machines form a very important section of the plant used in the production of the "Power" range of machine tools.

In course of production at the present time are quite a number of new-comers to the field of Australian-made machine tools.

Parts for the new "Power" hydraulic plain grinder with a capacity of 24 ins. x 6 ins. are



"Power" Pantograph.



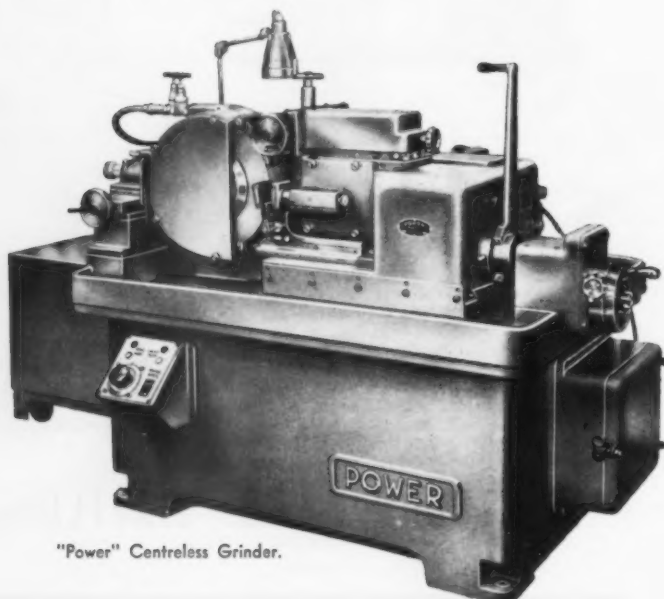
"Power" No. 0 Surface Grinder.



"Power" Rotary Surface Grinder.

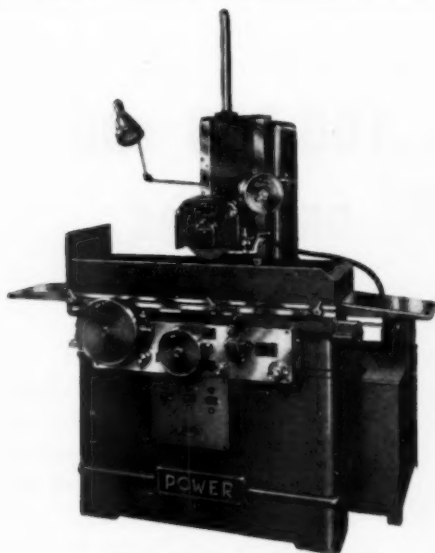


"Power" Tip Tool Lapping Machine.



"Power" Centreless Grinder.





"Power" Hydraulic Surface Grinder.

being machined, together with further batches of hydraulic surface grinders 18 ins. x 6 ins., 24 ins. x 12 ins., and soon 36 ins. x 12 ins. will follow.

Progress is being made on a "Power" Knife and Straight Blade Grinder, which has been designed to include the possibility of grinding scrapers for milk powder machinery to especially acute angles, and also Shearing Blades with 90 degrees cutting angle.

At the request of Repco Ltd., Pauer & Co. have designed a line borer which will be capable of boring both the largest and smallest automotive mainshaft and camshaft bores.

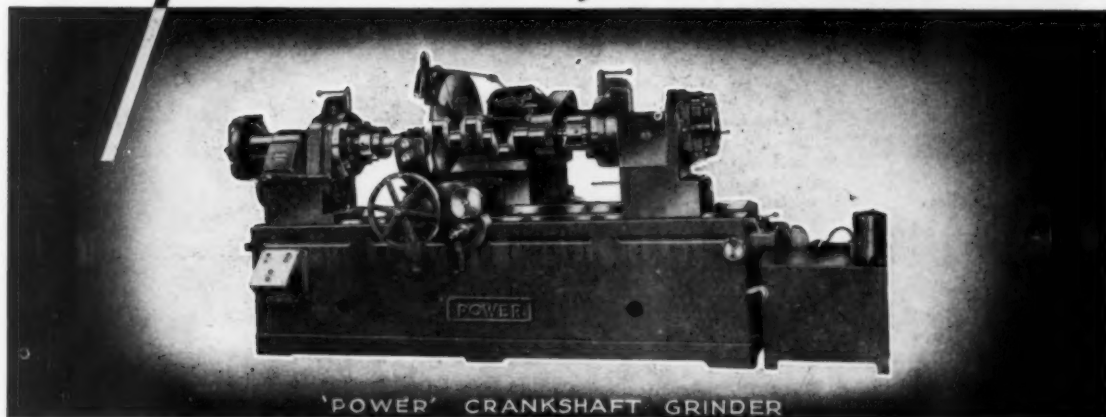
The range of "Power" surface grinders which are now so well known, has been extended both by the No. 4 Hydraulic model, with 36 ins. x 12 ins. capacity, and a No. 0 hand operated type with a maximum capacity of 9 ins. x 4½ ins. x 7 ins. high.

The first batch of "Power" Rotary Surface

Grinders are on assembly, and this machine, with 9 ins. table diameter, will be a valuable addition to this company's fine range of precision grinding machines.

Further orders have been received for the "Power" 3-dimensional pantographs which appeared on the market during the past twelve months, proving Pauer & Co's. belief that Australia can build what Australia wants, and that Australia wants what Australia can build.

Precision!  
by "POWER"



'POWER' CRANKSHAFT GRINDER

**PAUER & CO. PTY. LTD.**  
MAKERS OF MACHINE TOOLS



8-12 VALE ST., NORTH MELBOURNE (AUST.)  
PHONES — FJ6227 — FJ4480  
TELEGRAMS: "POWERGRIND" MELBOURNE



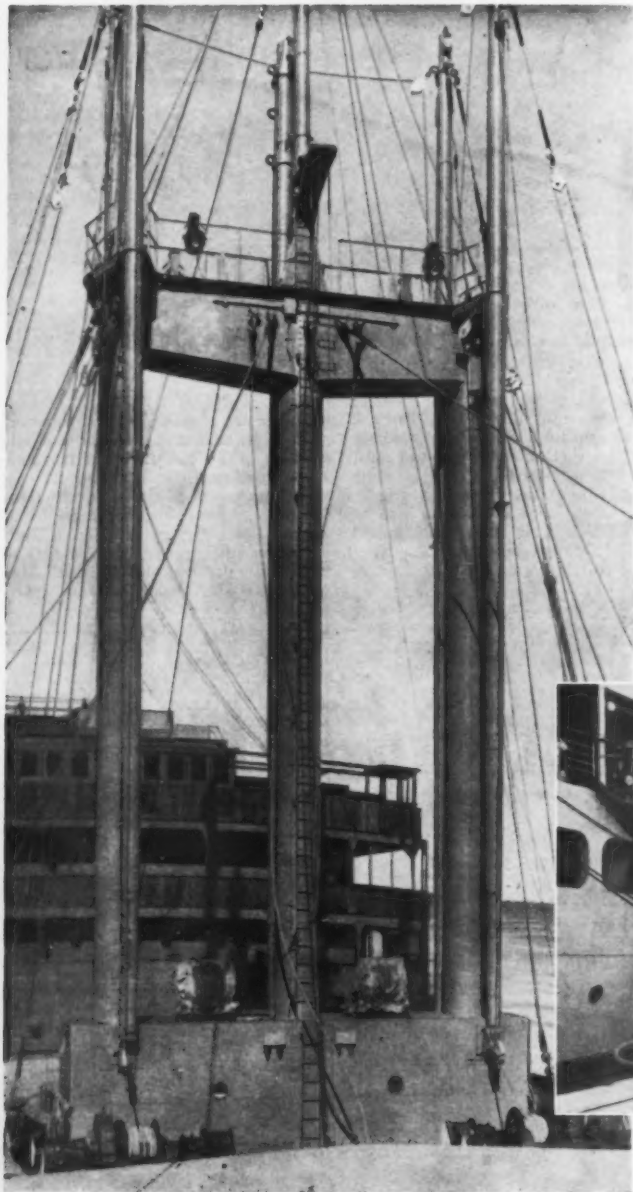
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Above—Gangway staging of Tubular Steel designed and manufactured by Stewarts and Lloyds for the S.S. Himalaya's maiden voyage to Australia.  
At left—Tubular Steel for ship's derricks is number one choice throughout the world today.

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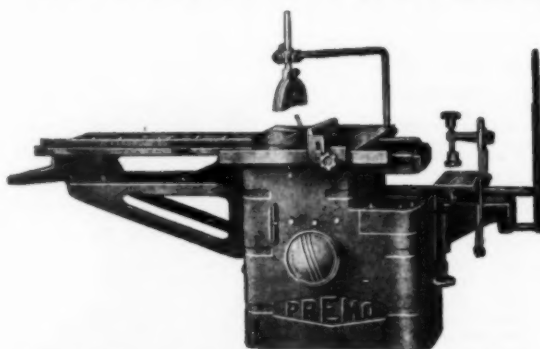


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## "PREMO" WOODWORKING MACHINERY



(At left):

### "PREMO" UNIVERSAL WOODWORKER

Fitted with 2 motors, this machine is capable of producing all types of Joinery and Cabinet work.

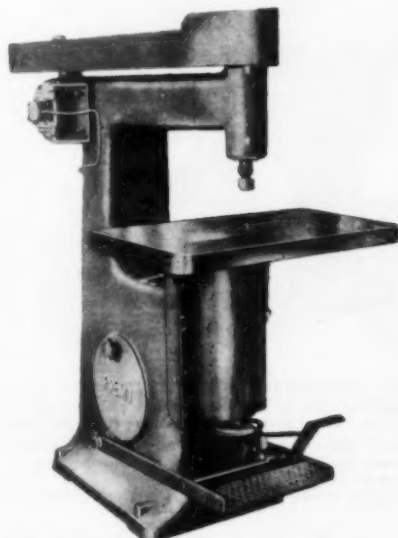
No installation expenses necessary.



THE MACHINE comprises Saw Bench, Surface Planer and Jointer, Thicknessing and Mortising and Boring Attachments, all mounted on substantial cast iron pedestals of modern design. The Ball Bearing Saw Spindle takes saws up to 15" diameter and a particularly easily operated Ball Bearing Squaring Off Table runs on the left-hand side. The Thicknessing Attachment will handle a maximum of 4" deep or 5" wide. The Mortising Attachment has a capacity for  $\frac{1}{2}$ " Square Mortices in Cabinet Timbers. A Moulding Head capable of producing any mould up to 2 inches wide may be supplied as an extra. This head is carried on the end of the saw spindle, and is complete with one pair of Knives and Spurs. Single Sided Tenoning may also be produced on this Unit. When Moulding or Tenoning, a wooden gap piece is inserted in the table in lieu of the metal gap piece used for sawing. The 6" Jointer, which is of heavy construction, is fitted with a large diameter Circular Head running on heavy Ball Bearings. The Tables are fitted with steel lips, both tables being adjustable. The fence will cant to 45 degrees. A solid rabbeting table is provided. Machine is complete with Knife and Belt guards. The Woodworker may be purchased with or without the Jointer as desired.

(At right):

"PREMO" HEAVY DUTY CROSS-CUTTING AND TRENCHING MACHINE, 5 h.p. motor mounted in head, carries 16" diameter saw, cuts 4" deep, 24" wide, can be canted and swivelled for angular cuts. A Trenching Head is available adjustable from  $\frac{1}{2}$ " to 2 $\frac{1}{2}$ ". Also made in a lighter pattern.



(At left):

"PREMO" HIGH SPEED ELECTRIC ROUTING MACHINE, high tensile spindle with accurately ground seatings runs in specially selected precision ball bearings at 18,000 r.p.m. The table is accurately surfaced and has about 3 $\frac{1}{2}$ " of pedal movement with adjustable stops. The usual motor is 2 $\frac{1}{2}$  h.p. but larger ones can be fitted on special order. The machine is particularly adapted for high class cabinet making work, pattern making, ship building and aircraft production.

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## "PREMO" WOODWORKING MACHINERY

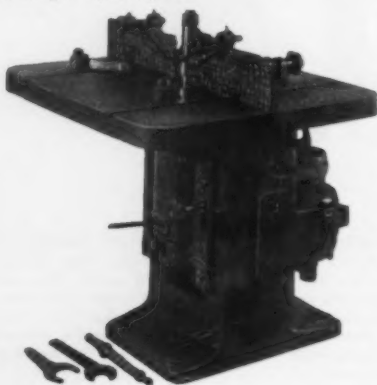


(Above):

"PREMO" PEDESTAL TYPE BALL BEARING SAW BENCHES WITH RISING AND FALLING TABLES are made in several sizes taking saws from 12" diameter to 26" diameter. The spindles run in carefully fitted ball bearing housings and the fences are accurately set so that precision cutting is obtained. The driving motor is usually mounted on the side of the pedestal; on special order, petrol engine drive can be fitted.

(Below):

THE "PREMO" BALL BEARING SPINDLE MOULDER is provided with screw adjusting fences, pressure springs and a very carefully fitted high tensile spindle running in ball bearings. The machine is capable of producing detail work of the highest class. The usual single speed runs at 5,000 r.p.m. but special two-speed machines can be run up to 8,000 r.p.m.



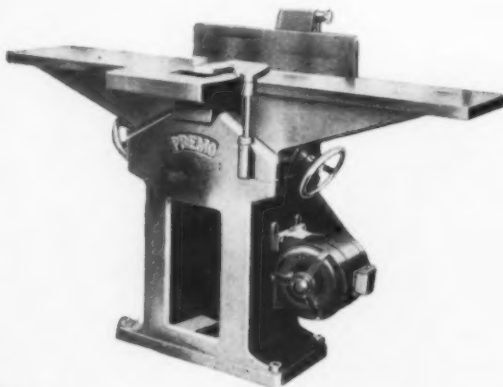
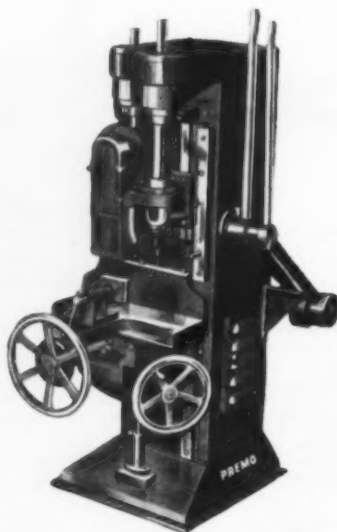
(At right):

"PREMO"  
CHAIN  
AND HOLLOW  
CHISEL  
MORTISING  
MACHINE

Enclosed Motor  
Drive

The Main Frame of modern design is carefully fabricated from mild steel. Slides are planed cast iron or mild steel as found most serviceable. The Chain Mortising Head takes standard chains, sprockets and guide bars, and exhaust is fitted to remove the chips. The Hollow Chisel Head takes chisels from 1/2" to 1" square.

Each head is fitted with an independent feed lever, and an automatic clutch stops all movement when the heads are returned to the top of the stroke. The table is adjustable in all directions.



(Above):

THE "PREMO" MOTORISED SURFACE PLANING AND JOINTING MACHINES ARE BUILT IN SEVERAL SIZES from 6" to 16" in width. The tables of the larger machine are fitted with draw-out movement and all machines are provided with a conveniently adjustable bevelling fence. Motors are mounted out of the way of any chips.

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**CANADIAN TYPE SAWMILLS WITH ALL THE NECESSARY LOG HANDLING**  
**EQUIPMENT**  
**TRANSFERS, TURNERS, ETC.**

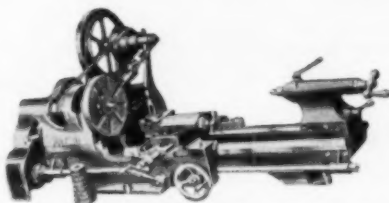
*The illustrations on the two previous pages accompanying these descriptions show a few only of the many varieties of woodworking machines. The Bandsaws, Swingsaws, Radial Arm Sawbenches, Squaring Off Saws and all the accessories and finishing machines like Boring Machines, Sanding Machines, etc. A complete line of Sawfitting Machinery has been developed for the heavy sawmiller, including Bandsaw Grinders, Circular Saw Gulleters, Bandsaw Stretchers, Bandsaw Brazers, etc.*

"PREMO" MACHINE TOOLS. The "Premo" line of Machine Tools includes:—

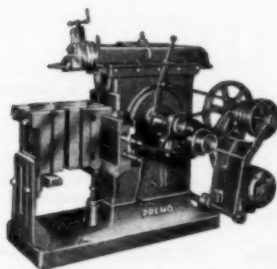
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**GRINDING MACHINES**  
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**SHAPING MACHINES**  
**HACKSAWING MACHINES**  
**SHEET METAL WORKING**  
**MACHINERY**



The "PREMO" Vertical Milling Machine with Timken Bearings, individual motor drive.



The "PREMO" 51" Centre Bench Lathe with Timken Bearings especially designed for small production jobs, technical schools, etc. A large number of accessories is available.



The "PREMO" 18" Crank Shaping Machine with individual motor drive.



The "PREMO" Horizontal Plane Milling Machine, individual motor drive and automatic feed.

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*A request on your letter-head will bring an illustration and quotation by return.*

"PREMO" is the registered trade name of products manufactured by **GOODALL & CO. PTY.**

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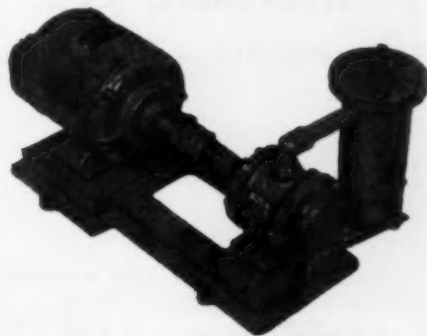
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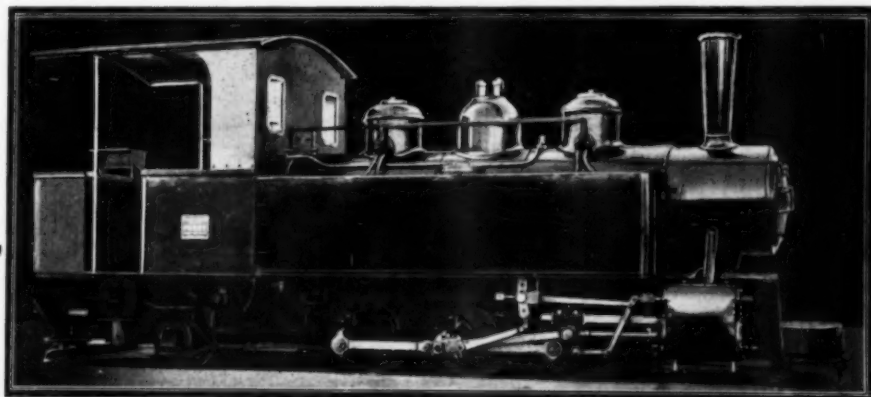




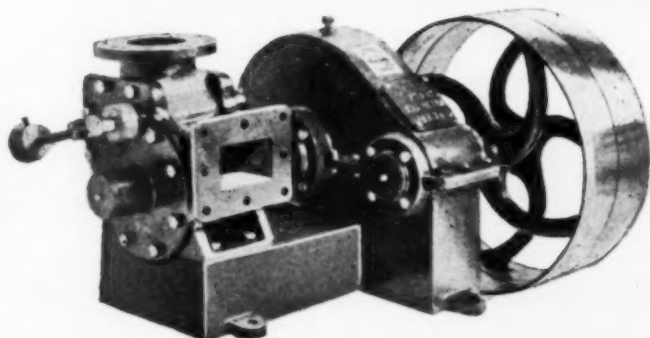
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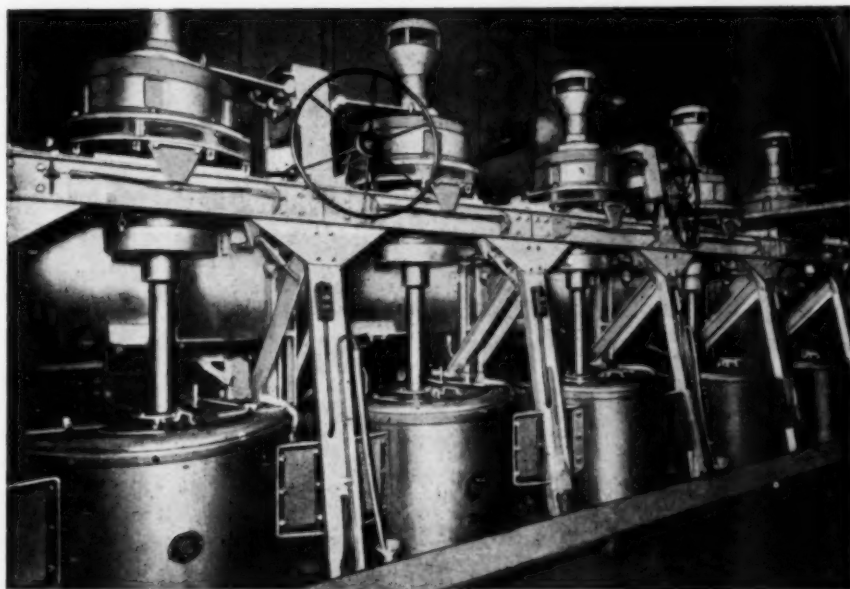


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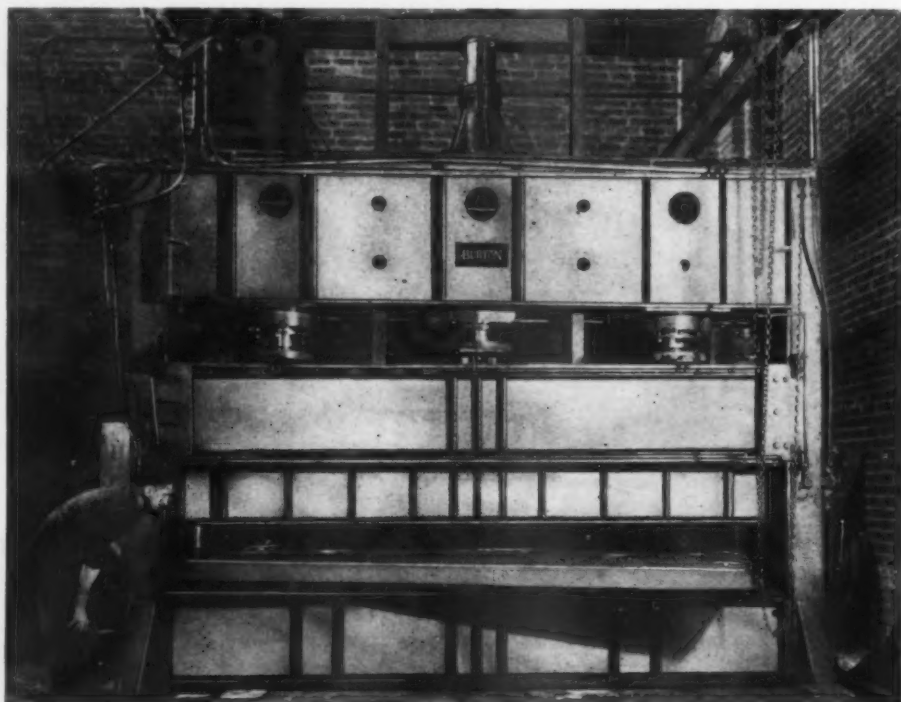


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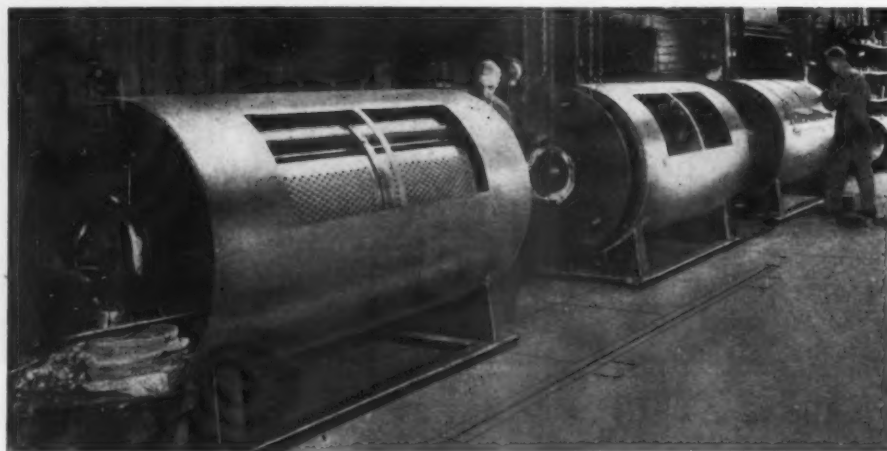
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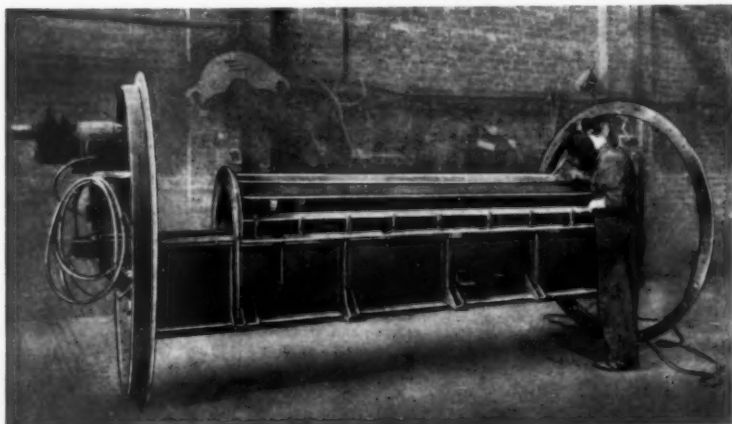
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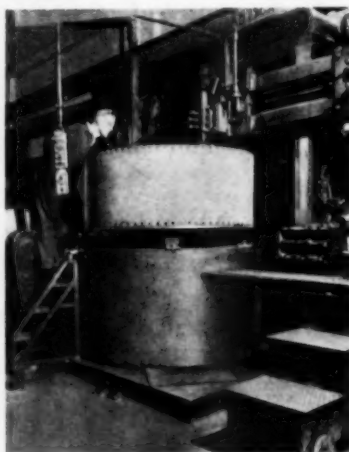
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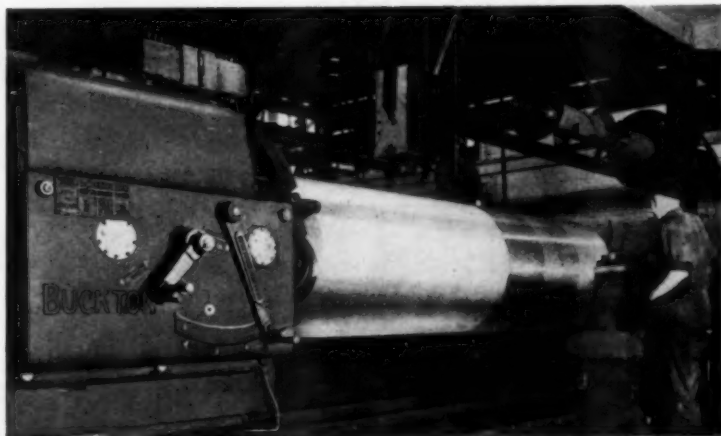
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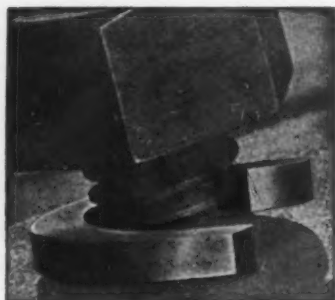
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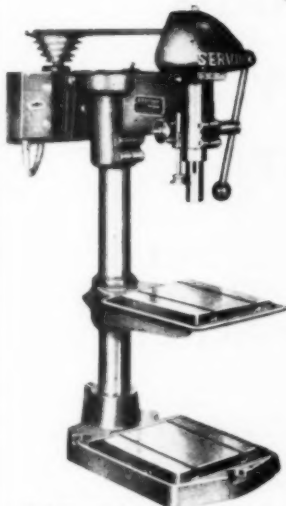
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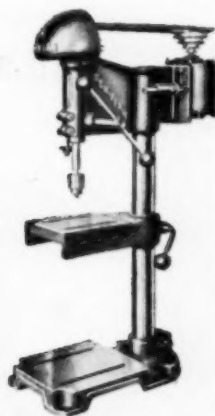
12" Drilling Machine, Model No. S.A.1.



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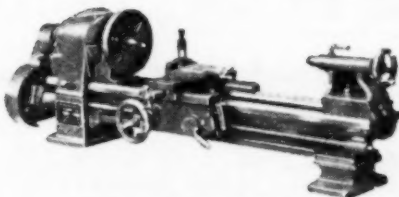
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Other items are the modern design 6" Servian Power Hack saw with self-contained coolant equipment and pump and the 4½" Centres Semi-Universal

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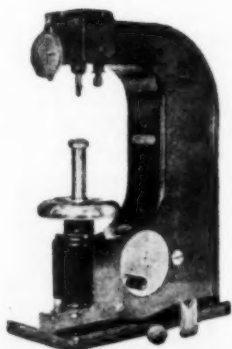
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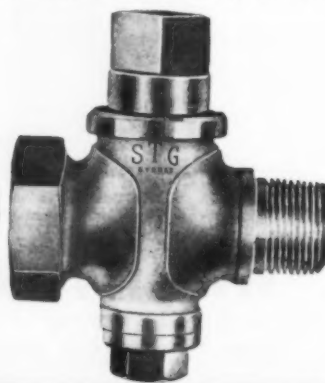
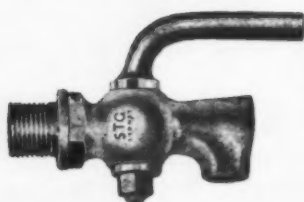
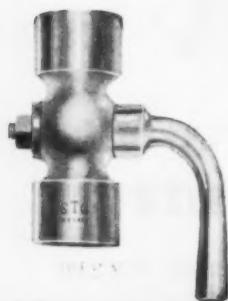
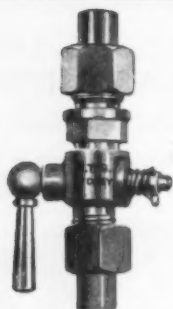
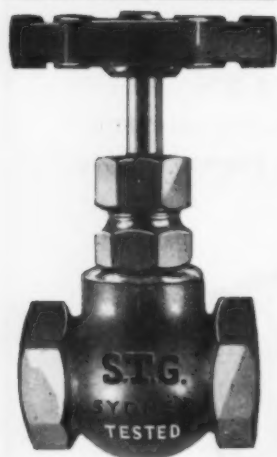
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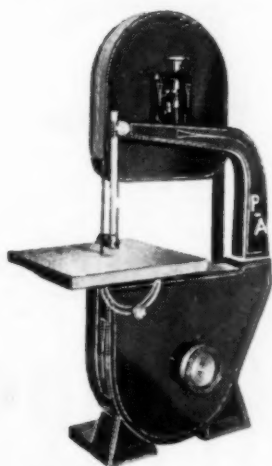




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## **“P-A”**

### **24-INCH WOOD AND PLASTICS MODEL BAND SAWING MACHINE**



Specially recommended for high speed band sawing as required by technical builders, cabinet makers and pattern makers, also for general sawmill use.

The saw pulleys have rubber inserted in rims which is easily replaced. Each pulley is supported directly under centre of rim by heavy ball bearings. The top pulley is carried on a vertical slide and is adjustable by hand wheel to suit different lengths of saw blade. Provision is made for tilting the top pulley to correct the position of saw on the face while the machine is in motion. The main table is arranged to cant 45 deg. to the right and it may be easily locked in the required position.

Adjustable top saw guide is provided of the roller type. The lower guide is provided with bronze or hard wood packing. Hinged guards which can be quickly opened for changing the saw are provided for the protection of the operator. Bottom saw pulley is driven by multiple vee-belts mounted on an adjustable plate and carried from the base of machine.

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**MODEL M107**  
Overhead Suspension Type.  
Three speeds, 1,100, 2,800, and 6,000 r.p.m. (Advise height of Circle to Floor when ordering.)

**MODEL M108**  
Universal Bench Type.  
Three speeds, 1,100, 2,800, and 6,000 r.p.m.  
Height, 24 ins.  
Weight, 102 lbs.

**MODEL M105**  
Bench Type.  
Single speed, 2,800 r.p.m.  
Height 10 ins.  
Weight 65 lbs.

**MODEL M109**  
Universal Floor Type.  
Three speeds, 1,100 r.p.m.  
Weight, 160 lbs. Height, 36 ins.

**MODEL M106**  
Universal Bench Type.  
Three speeds, 1,100, 2,800, and 6,000 r.p.m.  
Height, 24 ins.  
Weight, 102 lbs.

**MODEL M127**  
Portable Type.  
in 230v., single-phase only.

**MODEL M1055**  
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Single speed, 2,800 r.p.m.

**1 H.P. CAPACITY 6in. DIAMETER TOOLS**  
Available for 400v., three-phase A.C.; 220v., D.C.; 110v., D.C.; 440v., D.C.; 230v., single-phase A.C.; and 200v., 50c. A.C.

## Rex ROTARY FILES, TAPPED FILES

REX Rotary Files are manufactured in a large variety of shapes, many having been specially developed for work on intricate engine parts. All REX Files can be supplied in High Speed Steel, which must be stated separately when ordering. Standard shanks are 6mm. or 1/4in.



**MORRISFLEX Flexible Shaft Equipment** has been specially developed for cutting, filing, grinding and polishing components of Aluminium, Elektron, Non-ferrous Alloys and Ferrous Metals. Overhead suspension, bench and floor types are available, the two latter being readily portable.

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MORRISFLEX M105 Bench Model with Chuck Handpiece. Suitable for all general engineering and garage work.



MORRISFLEX Vibrator, driven off 1 h.p. motor on swivel base. Suitable for road-making and all concrete construction work.

MORRISFLEX M105 Monorail Suspension Model. Suitable for motor body industry and all garage work. All models can be supplied with multiple speeds and voltage and h.p. to requirements.



MORRISFLEX M105 Monorail Suspension Model. Suitable for motor body industries, motor garage trade, all foundry work, dressings, castings. All models can be supplied with multiple speeds and voltage and h.p. to requirements.



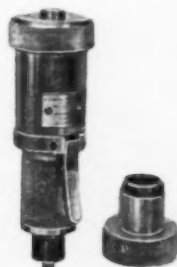
MORRISFLEX Jeweled, giving 2 1/2 in. max. cut, driven off 1 h.p. petrol motor on swivel base.



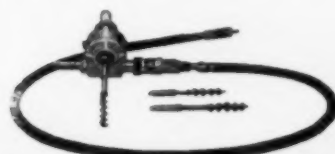
MORRISFLEX Biflex Machine with diamond stone dresser, stones and pilots. A very useful kit in the motor car and garage trade and general engineering.



MORRISFLEX Universal Shaft, specially designed for flexible drive on stationary motors.



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MORRISFLEX Universal Shaft with Clutch Handpiece and Gearbox.



MORRISFLEX M124 Portable Bench Model.



MORRISFLEX M125 Portable, designed for Heavy Bench Work.



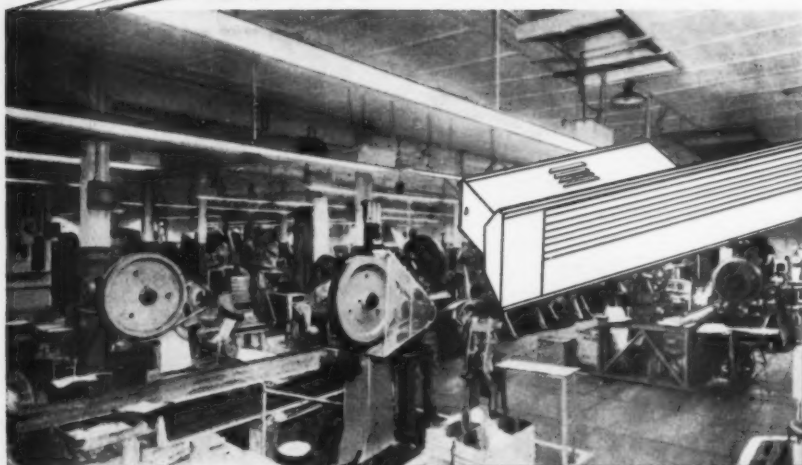
MORRISFLEX M125 mounted on Trolley, specially designed for general use in foundries.

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On the basis of high production capacity, low operating expenses and all-round versatility, Welded Products' Bending Presses are high income earners. The rigidity of their deep beams ensures a finished accuracy of product that invariably eliminates fitting before assembly.

Put them to work bending, blanking, punching, forming—either singly or in combination, with or without power feeds and with one, two, three or more operators.



## ALL-STEEL BENDING PRESSES



Above: 10 ft. x  $\frac{1}{2}$  in. m.s. plate, all-steel bending press.

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SPECIALISTS IN ROLLED STEEL MACHINERY

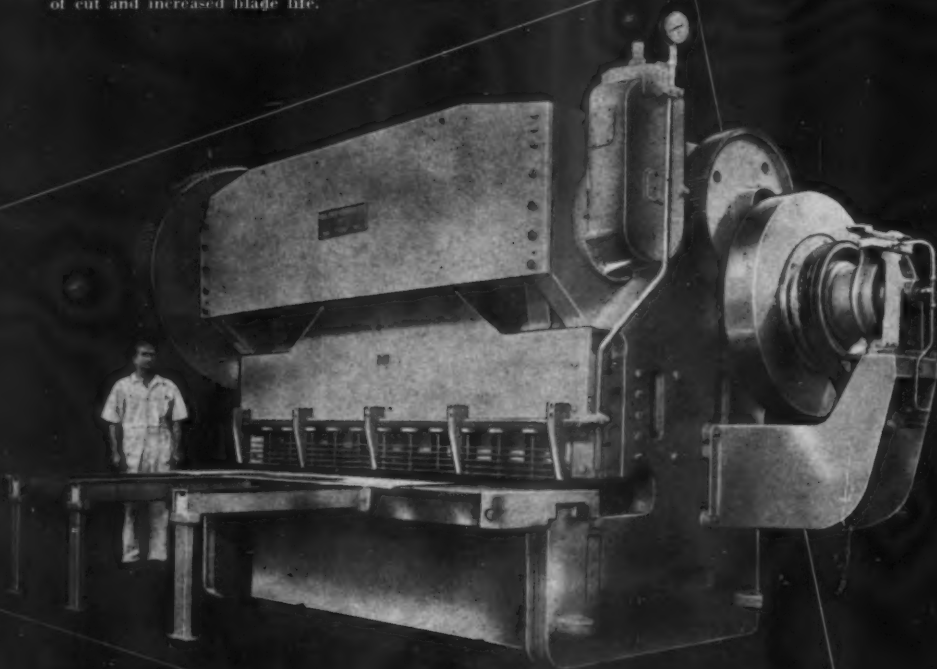


## INVEST IN EARNING POWER, INVEST IN...

Welded Products' All-Steel Guillotines possess earning power: they are fast, they are accurate, they are easily controlled—and they keep going shift in, shift out, thanks to rigid, rolled steel frames—guaranteed unbreakable without reserve.

Users report that the service life of blades is as much as five times that normally expected.

A rigid, back pressure beam (which is part of the frame), supersedes the conventional fish-back cutting beam on all but the lightest machines. This design feature, plus exclusive centre guiding of the cutter beam, resulting in a true press guiding over the whole width, is largely responsible for the greater accuracy of cut and increased blade life.



## ALL-STEEL GUILLOTINES

Above: 10 ft. x 1 in. m.s. plate, all-steel guillotine.



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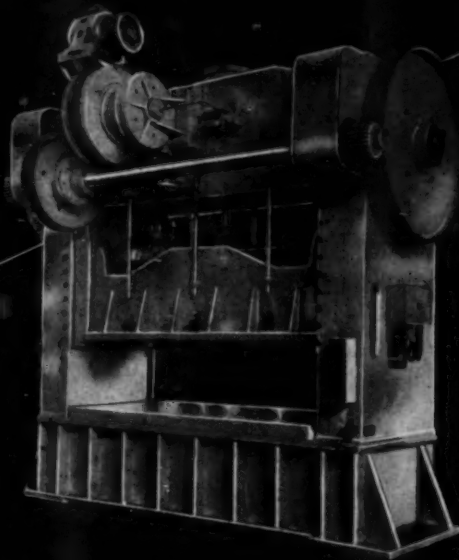
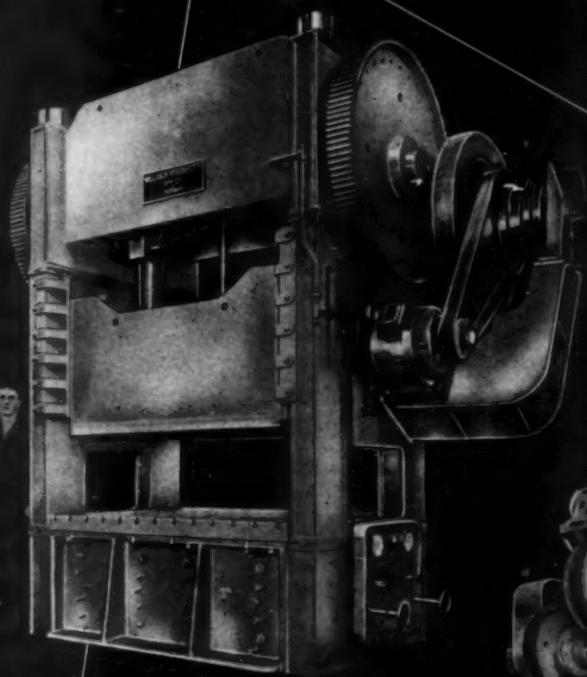
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## ORGANISE FOR EARNING POWER. ORGANISE WITH...

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When you equip with a Welded Products' press you equip with the right press for earning power—fast, economical production.



### ALL-STEEL PRESSES

*At left: 200-ton, all-steel, double-crank, panel, blanking and forming press; top right: 75-ton, all-steel open-fronted press; bottom right: 250-ton, all-steel, double-crank, blanking and forming press.*



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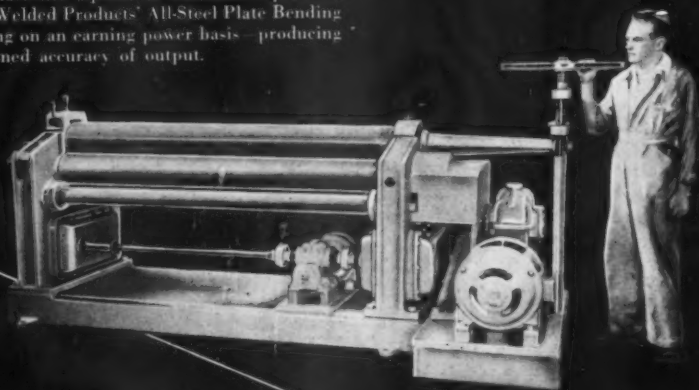
THE AUSTRALASIAN



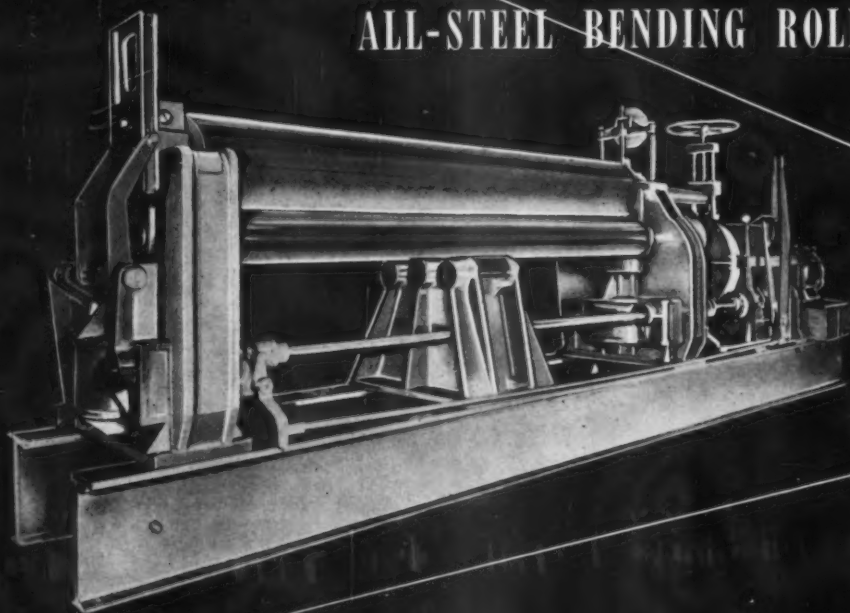
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## EQUIP FOR EARNING POWER, EQUIP WITH...

Essentially high duty machines capable of continuous operation at maximum capacity. Welded Products' All-Steel Plate Bending Rolls place plate curving on an earning power basis—producing in quantity with sustained accuracy of output.



## ALL-STEEL BENDING ROLLS



Top illustration: 6 ft. x  $\frac{1}{2}$  in. all-steel m.s. plate bending rolls; below: 12 ft. x 1 in. all-steel m.s. plate bending rolls.



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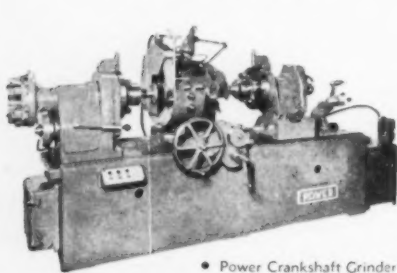


# Top Efficiency

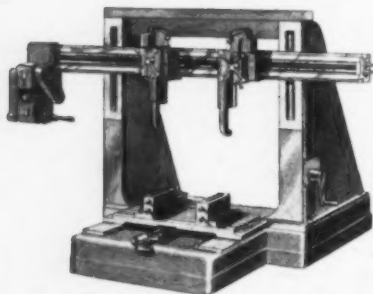
...IN THE AUTOMOTIVE WORKSHOP



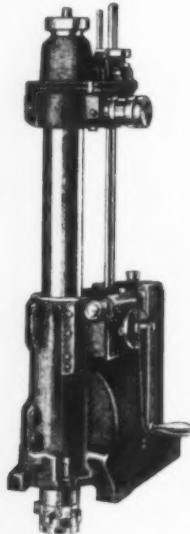
Owners of automotive engineering workshops who have installed Repco thoroughly-proved equipment, benefit immediately with a rapid rise in output and efficiency. That is because this equipment represents the latest development in engineering skill and is designed for time-saving efficiency and economy.



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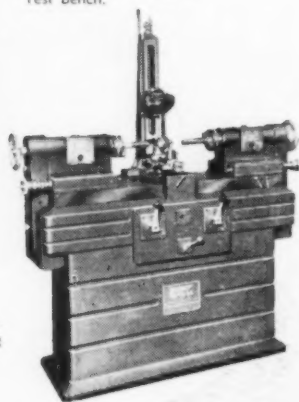
• "Replex" 80 amp. Fast Battery Charger.



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• "Replex" Electrical Test Bench.



• (Right): "Power" Hydraulic Con-Rod Boring Machine.

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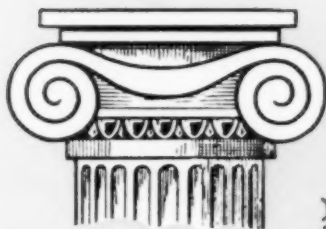
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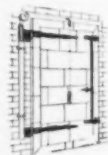
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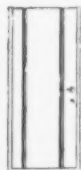
"WATERLOO" STEEL ROLLER SHUTTERS



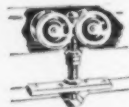
ROLLING GRILLES



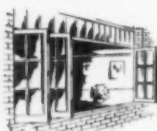
"WATERLOO" TIN CLAD FIRE DOORS



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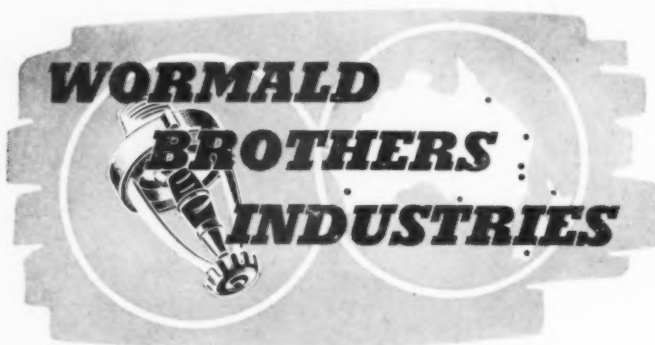


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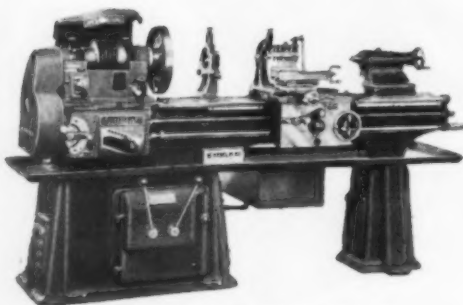


# MACHINE TOOLS

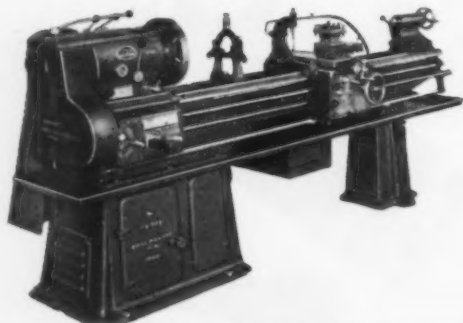
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### Australian Made "NEW VISBY" LATHES

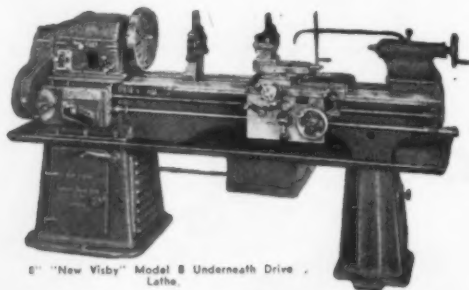
● Purcell's "NEW VISBY" LATHES represent machines of first class quality and perfection. They can compete with any other product in regard to design, construction, capacity, workmanship and finish. Australian-made motorised high speed precision lathes are equipped with underneath belt drive or geared headstock, lead screw and feed shaft and "Norton" type change gear box, and built to Dr. Schlesinger's Precision limits.



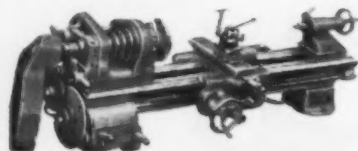
8" "New Visby" Model MNI Pedestal Gearbox Lathe.



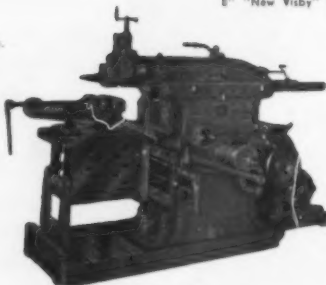
8 1/2" "New Visby" Heavy Duty All Geared Head Lathe.



6" "New Visby" Model B Underneath Drive Lathe.



8 1/2" "Sheraton" Automatic Crossfeed Bench Lathe.



28" stroke "Demco" Heavy Duty shaping Machine.



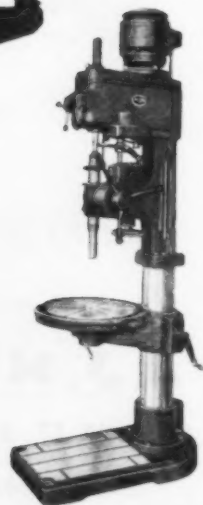
1" capacity "Damco" High Speed Drilling Machine.



1/2" capacity "Demco" 3-Spindle Drilling Machine.



8" x 8" "Milro" High Speed Hydraulic Hacksaw Machine.



1 1/2" capacity "Milro" Geared Drilling Machine.



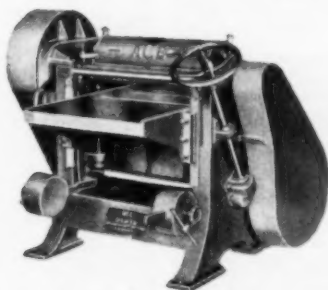
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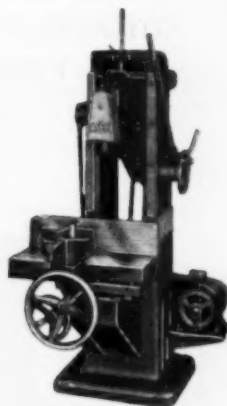
## FOR THE WOODWORKER



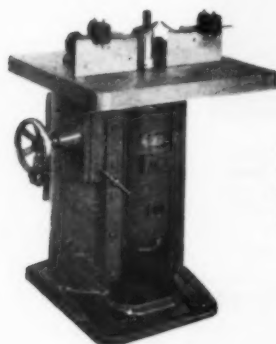
"Ace" 18" Band Saw.



"Ace" Planer and Thicknesser.



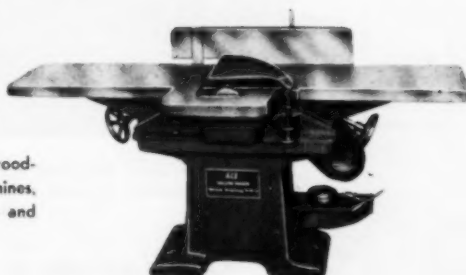
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#### SALIENT FEATURES OF THIS EQUIPMENT ARE:—

1. Rugged construction, as evidenced by main contactor of 1000 amp. rating and cast grid accelerating resistor of ample rating.
2. Reverse operation by combined isolating and reversing knife switch.
3. Sectionalised construction of cubicle to facilitate packing and despatch.
4. Dustproof enclosure.
5. Locking covers on push buttons to prevent operation other than by authorised persons.
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**SWITCHGEAR — MINING ELECTRICAL EQUIPMENT — CONTROLLERS**





# AUSTRALIA'S INDUSTRIAL PROGRESS

## THE STORY OF INDUSTRY AS TOLD BY THE FIGURES

ELSEWHERE in these pages the story of Australia's industrial growth has been conveyed to readers by the written word. Here it is depicted by figures. Statistics are generally accounted monotonous; but they have their place in the study of business conditions and industrial progress, and they merit careful perusal and unhurried consideration, especially seeing that they emanate from the bureau of the Australian Commonwealth Statistician. They are dependable because they are authentic.

SUMMARY OF FACTORY STATISTICS.

Particulars		1938-39	1945-46	1946-47	1947-48	1948-49 (a)	Percentage increase - 1948-49(e) on -	
							1938-39	1947-48
Factories	No.	26,941	31,184	34,768	37,356	40,010	48.51	7.10
Persons employed(a)	No.	565,106	745,258	804,929	848,876	890,454	57.57	4.90
Salaries and Wages paid (b)	£'000	106,743	205,819	237,174	285,765	338,878	217.47	18.59
Value of Power, Fuel & Light, etc. used	£'000	15,700	27,037	31,020	37,094	854,670	187.76	18.57
Value of Materials used (c)	£'000	281,303	488,287	569,144	683,729			
Value of Production	£'000	203,417	352,324	410,862	489,296	569,660	180.05	16.42
Value of Output	£'000	500,420	867,648	1,011,026	1,210,119	1,424,330	184.63	17.70
Value of Land and Buildings (d)	£'000	130,920	186,939	193,152	211,143	232,254	77.40	10.00
Value of Plant and Machinery (d)	£'000	143,662	185,545	189,693	213,719	246,165	71.35	15.18

VALUE OF OUTPUT AND COSTS OF PRODUCTION.

Item of Expenditure	1946-47		1947-48		1948-49 (a)	
	Value	Percentage on Total Value	Value	Percentage on Total Value	Value	Percentage on Total Value
Salaries & Wages	£'000	£	£'000	£	£'000	£
Power Fuel Light etc. Used	237,174	23.46	285,765	23.61	338,878	23.79
Materials Used	31,020	3.07	37,094	3.07	854,670	60.01
Margin for Other Miscellaneous Expenses, Charges Profits etc	569,144	56.29	683,729	56.50		
	173,688	17.16	203,531	16.82	230,782	16.20
Gross Value of Output	1,011,026	100.00	1,210,119	100.00	1,424,330	100.00

SALARIES AND WAGES PAID.

Year	Total Amount Paid			Average Per Employee		
	Males	Females	Total	Males	Females	Total
1946-47	£'000	£'000	£'000	£.	£.	£.
1947-48	199,772	37,402	237,174	345.18	188.36	305.12
1948-49	241,732	44,033	285,765	394.24	213.99	348.95
	(a)	(a)	(b)338,878	(a)	(a)	(a)

EMPLOYMENT IN FACTORIES.

YEAR	MALES			FEMALES			PERSONS		
	No. Employed (a)	Increase or Decrease on Previous Year		No. Employed (a)	Increase or Decrease on Previous Year		No. Employed (a)	Increase or Decrease on Previous Year	
		Numerical	Rate per cent		Numerical	Rate per cent		Numerical	Rate per cent
1946-47	604,300	+55,412	+10.10	200,629	+4,259	+2.17	804,929	+59,671	+8.01
1947-48	640,925	+36,625	+ 6.06	207,951	+7,322	+3.65	848,876	+43,947	+5.46
1948-49	(b)	(b)	(b)	(b)	(b)	(b)	890,454	641,578	4.90



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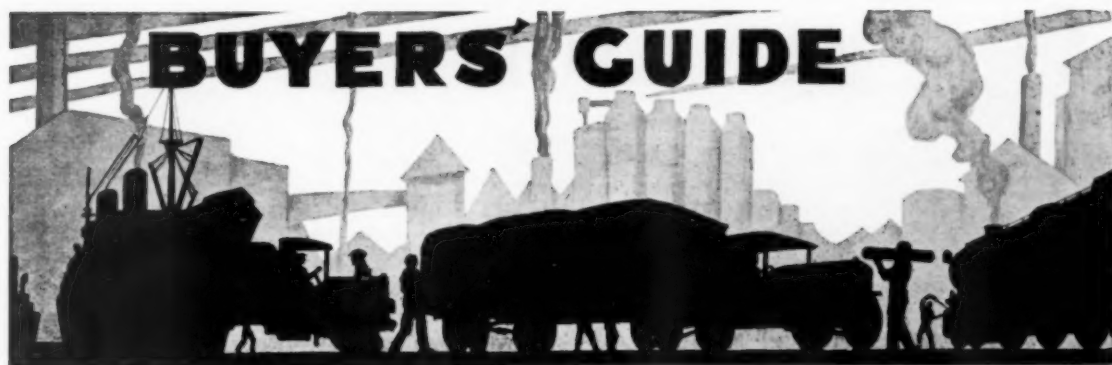
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Thread cutting is simple with the "Advance" and an indicator is standard equipment.

The complete unit, including motor and a forward and reverse switch, is so constructed to be easily moved and plugged into single phase supply.

The compound slide rest has top slide, adjustable to any angle, and the cross slide is T slotted for boring work or jig fastening.

**SPECIFICATIONS:**  
Centre Height 8 $\frac{1}{2}$ in.  
Distance between Centres 21in.  
Swing in Gap 8 $\frac{1}{2}$ in.  
Hole through Spindle 1 $\frac{1}{2}$ /32in.  
Diameter of face plate 8 $\frac{1}{2}$ in.  
Screwcutting Range 4-60TPI  
Fine feeds for traverse 4-60TPI

**EXTRAS OBTAINABLE**  
Three point fixed Steady.  
Travelling Steady.  
Vertical Slide.  
Milling Attachment.  
Machined Back Plates.  
Self Centring Chucks.  
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$\frac{3}{4}$ in. CAPACITY

A high grade machine tool of fine finish and accuracy. The table can be tilted for angle work and revolves on machined faces.

The Spindle is bored No. 2 Morse Taper and runs in ball bearings, the six spline spindle giving ample drive, and is independent of the five step pulley.

A slow speed attachment allows for tapping and screwing operations or for heavy reaming and spot facing.

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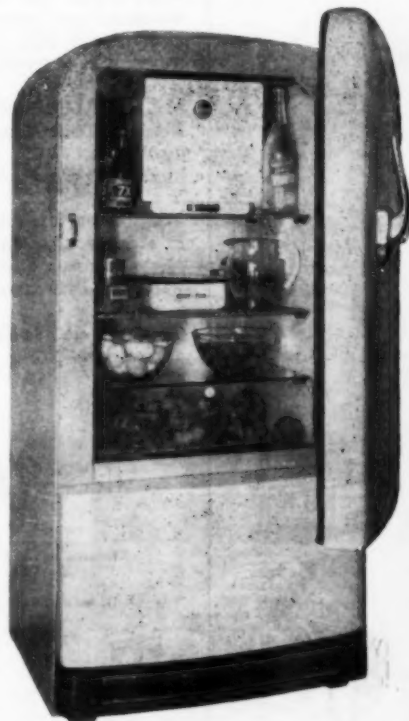
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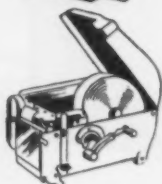
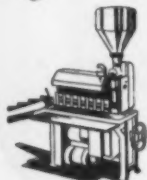
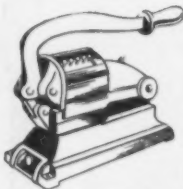
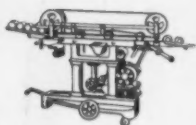
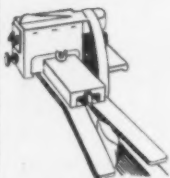
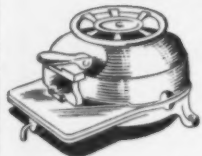
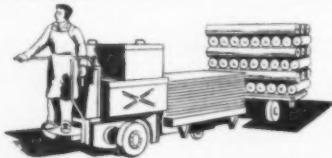
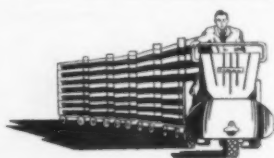
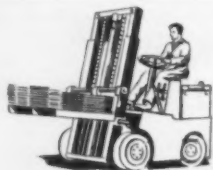
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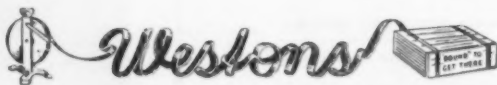
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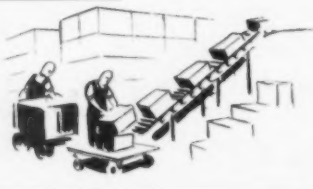
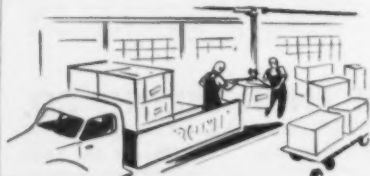
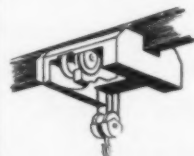
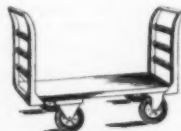
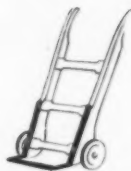
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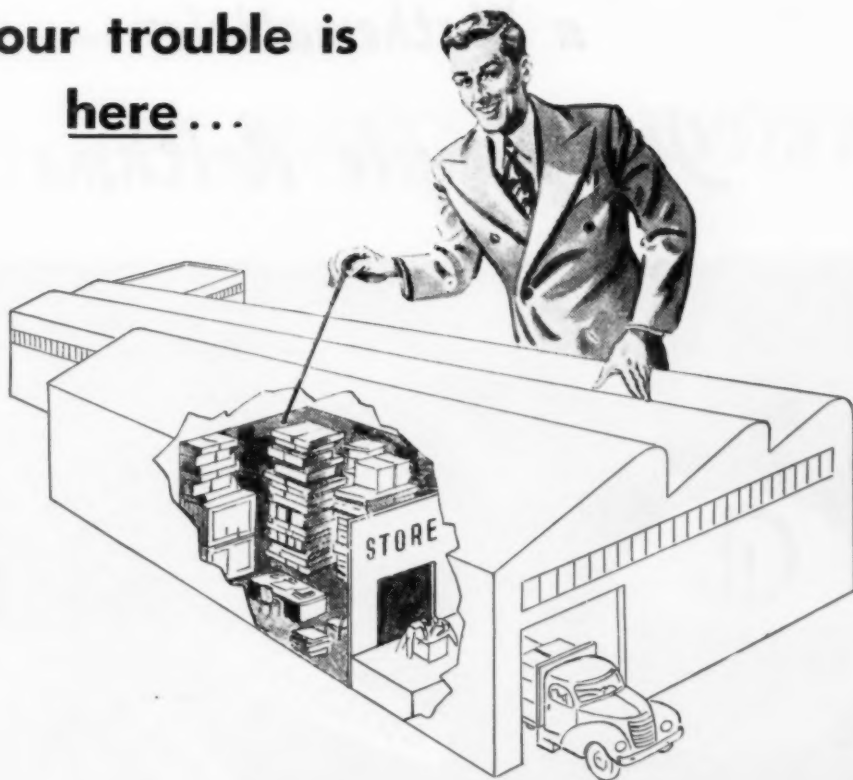
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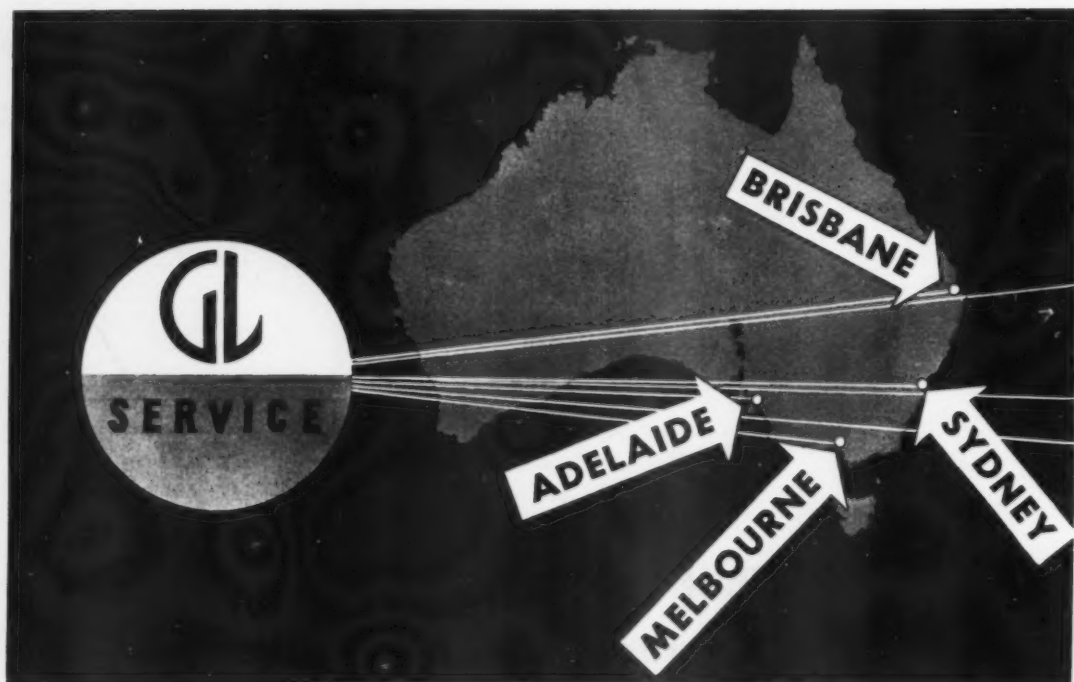
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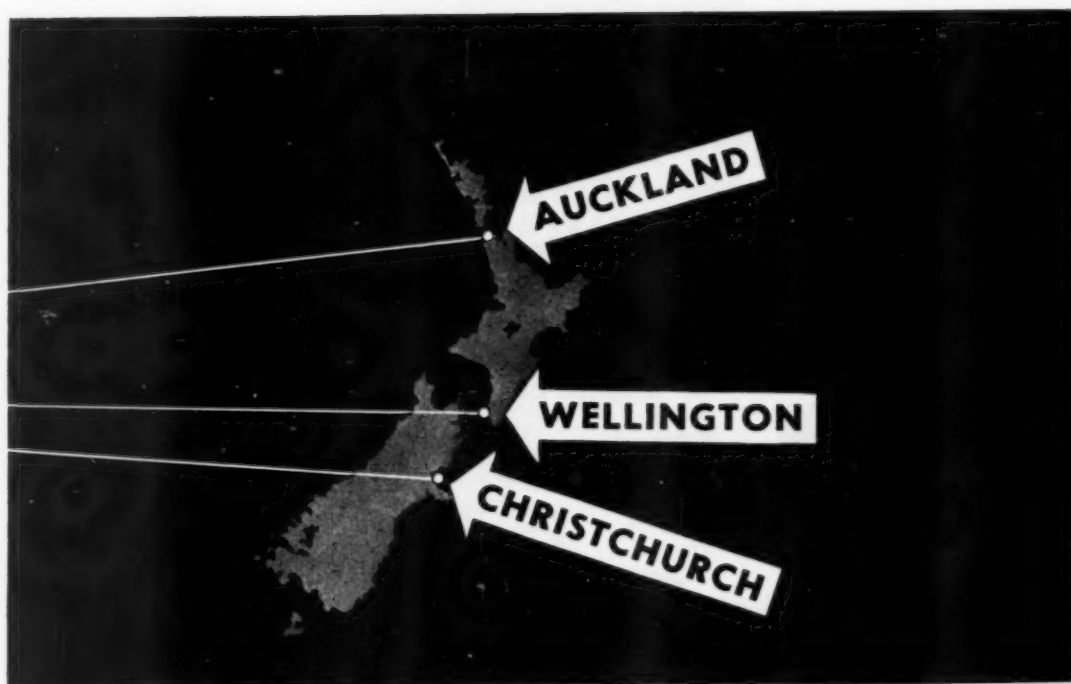


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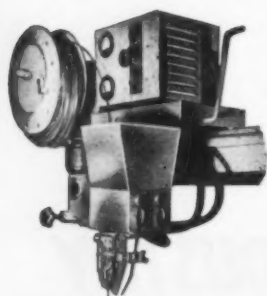
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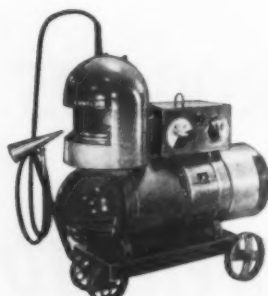
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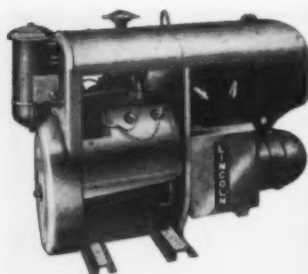
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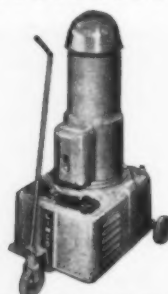
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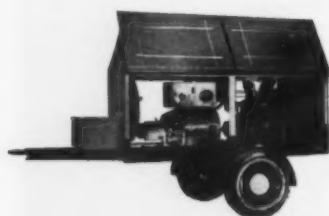


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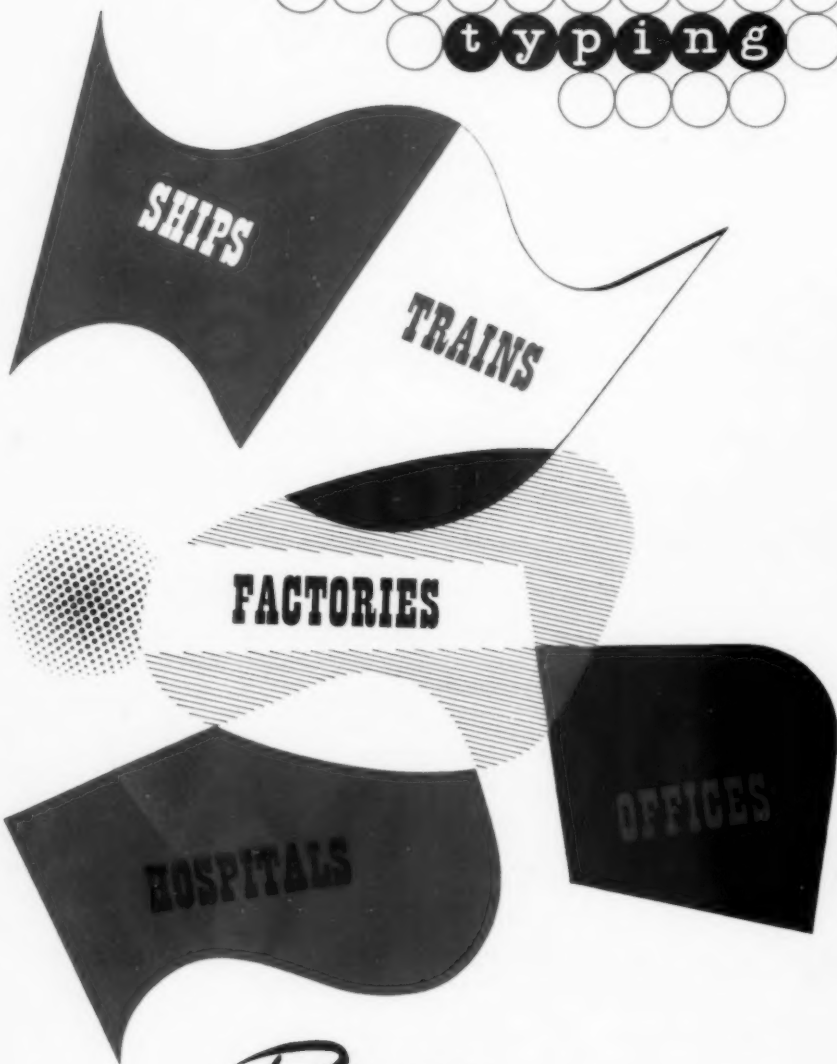
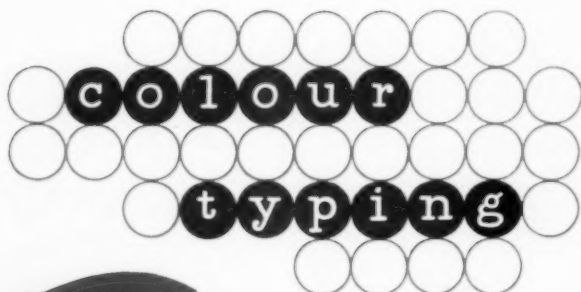
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